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WATER SUPPLY & SANITARY IMPROVEMENT

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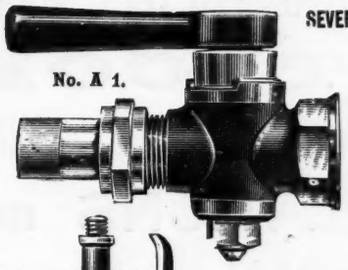

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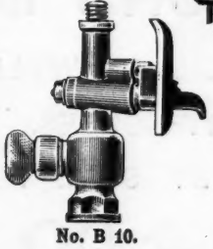
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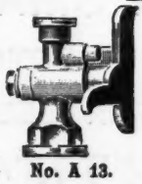
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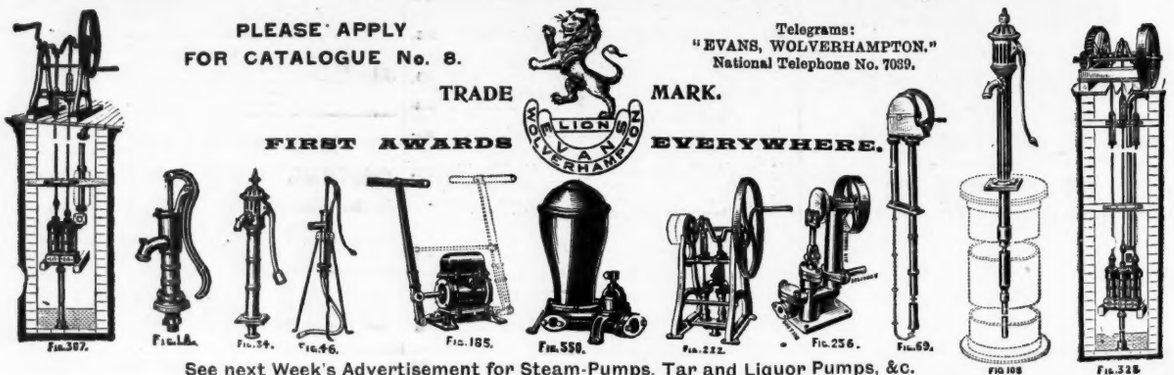

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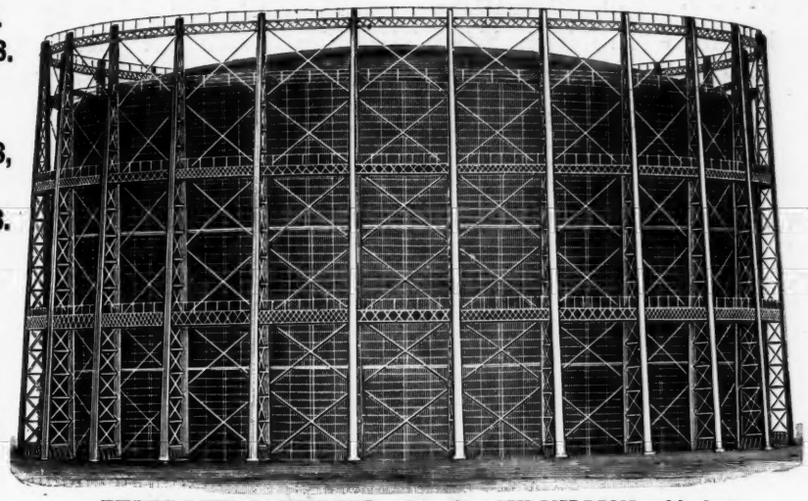

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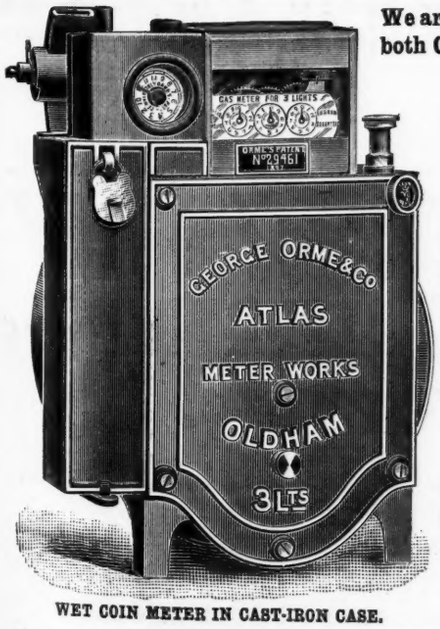

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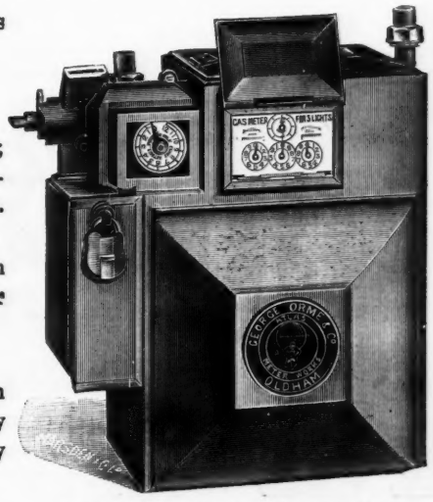

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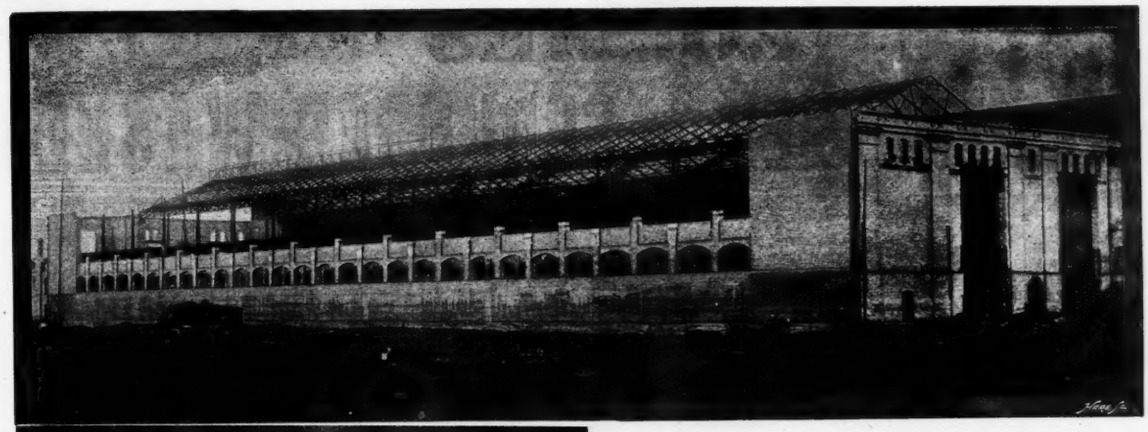

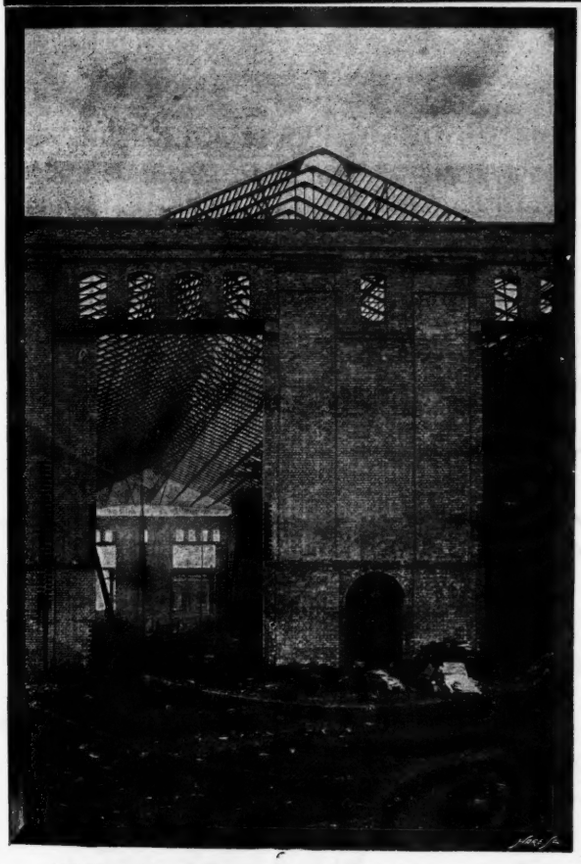

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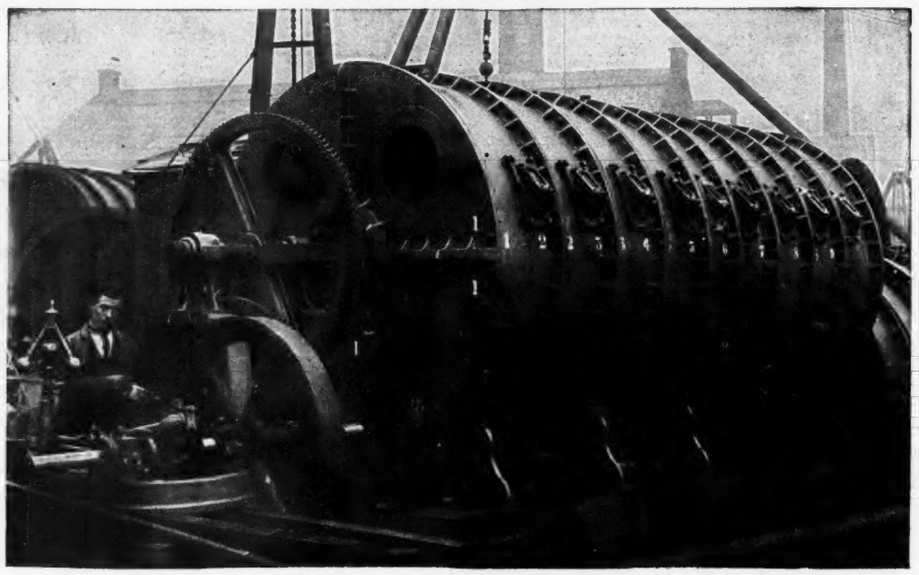

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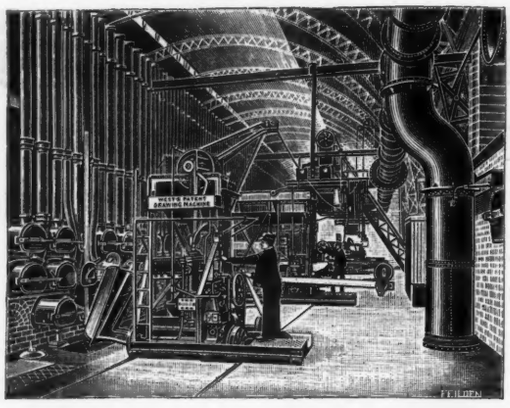

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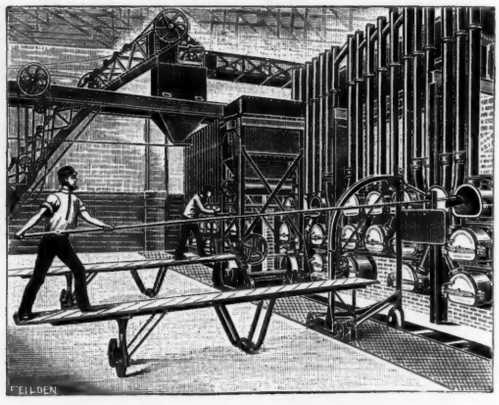

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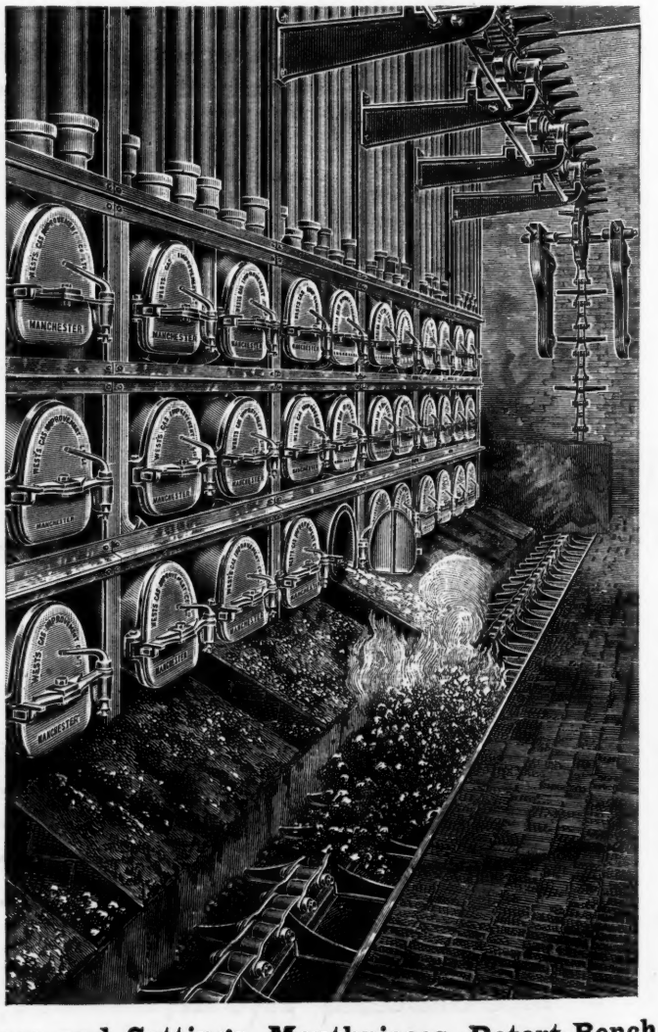

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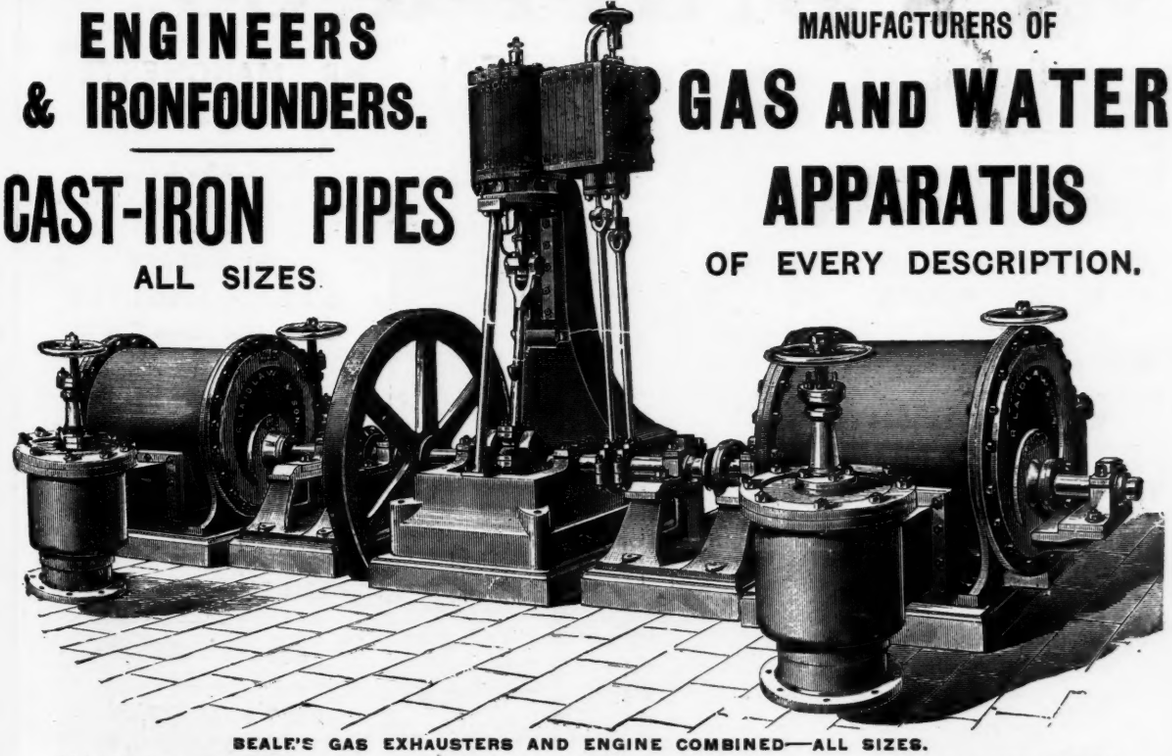

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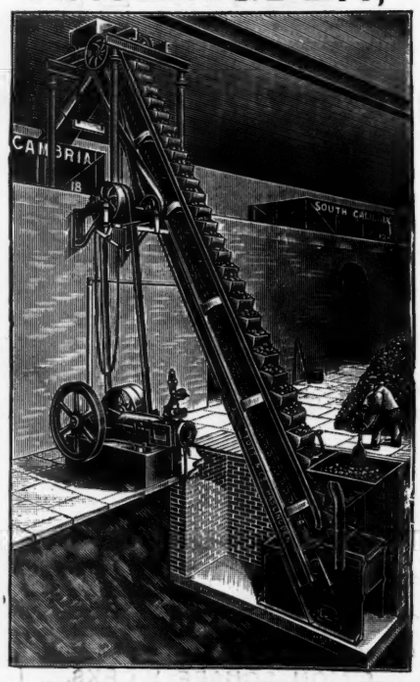

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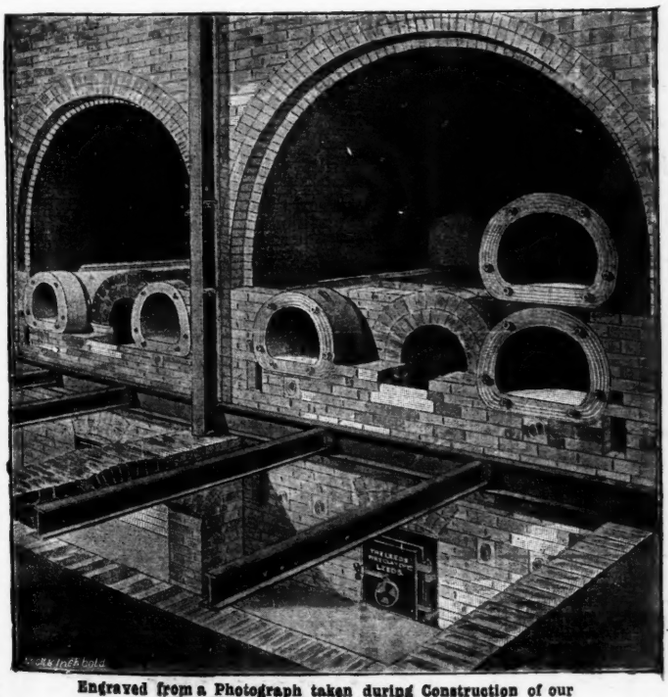

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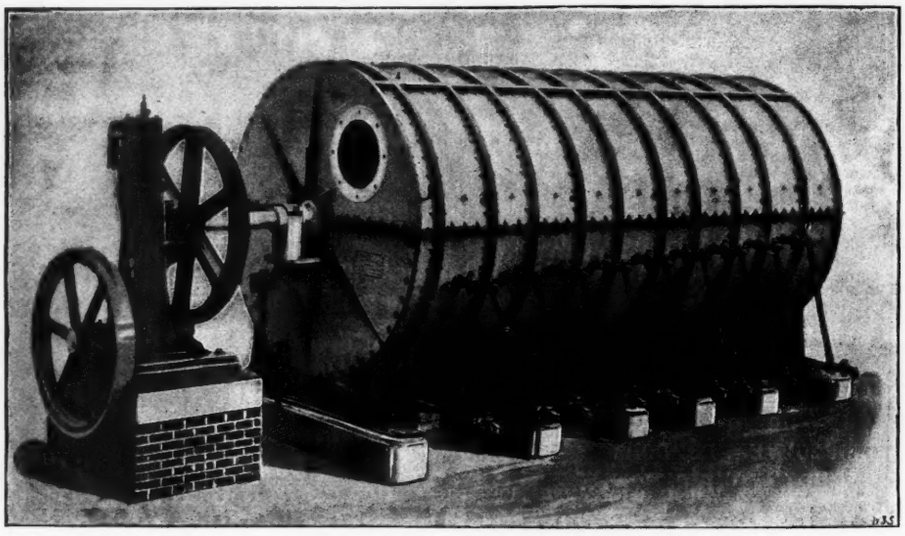

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Copenhagen	700,000
Copenhagen (Second Contract)	2,500,000
Belfast	1,700,000
Belfast (Second Contract)	4,500,000
Brussels	700,000
Brussels (Second Contract)	700,000
Liverpool	3,500,000
Liverpool (Second Contract)	4,500,000
Tottenham	750,000
Tottenham (Second Contract)	750,000
Santiago de Cuba	400,000
Swansea	750,000
Manchester	3,000,000
Brighton	1,750,000
Preston	1,500,000
New York	1,200,000
Southport	750,000
Bath	1,000,000
Newburgh, N.Y.	350,000
Newburgh, N.Y. (Second Contract)	250,000
Hoylake	125,000
Coventry	600,000
Coventry (Second Contract)	600,000
Bordentown, N.J.	125,000
Winchester	200,000
Shanghai	225,000
Stockport	500,000
Norwich	1,000,000
Holyoke, Mass.	600,000
Lea Bridge	350,000
Lea Bridge (Second Contract)	350,000
Stockton-on-Tees	500,000
St. Joseph, Mo.	750,000
Edinburgh	2,000,000
Guildford	350,000
Brentford	1,200,000
Bridlington	125,000
Syracuse, N.Y.	850,000
Middlesbrough	1,250,000
Croydon	1,250,000

	Cub. Ft. Daily.
Commercial Gas Co.	850,000
Commercial (Second Contract)	850,000
Commercial (Third Contract)	1,250,000
L. & N.W. Railway, Crewe	700,000
Taunton	225,000
Lawrence, Mass.	400,000
Rotterdam	850,000
Dorking	125,000
McKeesport, Pa.	500,000
The Gaslight and Coke Co., Bromley	3,750,000
The Gaslight and Coke Co., Nine Elms	2,750,000
Durham	200,000
New York (Remodelled)	11,000,000
Scarborough	800,000
Perth, W.A.	125,000
Bremen	550,000
Maidenhead	225,000
Epsom	225,000
North Middlesex	150,000
Wandsworth and Putney	1,800,000
Aarhus	800,000
Falmouth	150,000
Southampton	800,000
Hartlepool	750,000
Utrecht	1,000,000
Deventer	150,000
Portsmouth	1,000,000
Bournemouth	1,000,000
Aylesbury	150,000
Hamburg	1,750,000
Dublin	2,000,000
Redhill	275,000
Posen	450,000
Stockport (Second Contract)	500,000
Brighton (Second Contract)	1,750,000
Croydon (Second Contract)	625,000
Maidenhead (Second Contract)	225,000
The Gaslight and Coke Co., Beckton	2,250,000
The Gaslight and Coke Co., Fulham	1,750,000

The 1891 Installations of The Gaslight and Coke Co., 12,000,000 Cubic Feet Daily.

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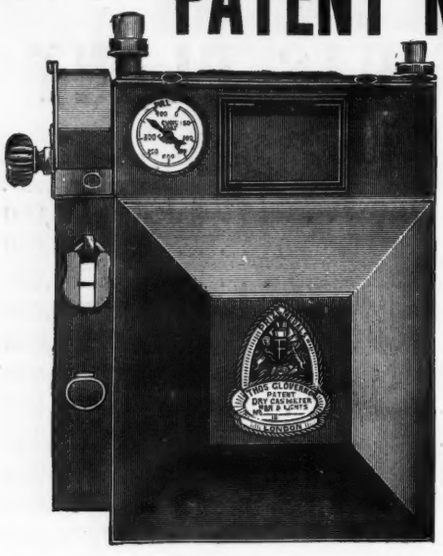

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EDITORIAL NOTES.

A Stevenson Memorial.

IN a letter which will go straight to the heart of every gas engineer and manager who reads it, Mr. H. E. Jones invokes the aid of the "JOURNAL" for the formation of a Fund to be applied to the raising of a suitable memorial to the late George Ernest Stevenson, killed at the post of duty. It is the only possible way in which a satisfactory turn can be given to the reminiscence of this tragic occurrence. It is good to preserve the memory of such self-sacrifice as that of Stevenson, who would not seek safety in flight from a danger which, as Mr. Jones remarks, he could gauge better than the others present on the scene. The narrative of what was compressed into those brief moments between the causation of the accident and the fatal catastrophe will never be adequately told; but this at least we know, that the master stayed at the front, and must be supposed to have been occupied to the last in doing all that was humanly possible to stop the impending mischief. His is an example that should inspire all who seek to attain responsible employment in the gas industry; and we gladly agree to help in every possible way to perpetuate the remembrance of Stevenson's devotion, and glorious, if melancholy, death.

London Gas Bills for Parliament.

THERE is promise of plenty of gas interest for the next parliamentary session. The London County Council, as usual, intend to have many irons in the fire; and among these is to be one for stirring up the London Gas Companies with the help of the portable photometer, and also for regulating the charges for coin-meter supplies. If the perfervid gentlemen who are responsible for the annual legislative programmes of the London County Council are not careful, they will run this meddlesome body into the undignified state of having its powers of parliamentary action severely cut down for the protection of the ratepayers. There is a degree of wrongheadedness manifested in the propensities of the London County Council which is fast bringing it into contempt. This is not the place to descant upon the antagonism into which the irrepressible fussiness of the Council about the water question has forced other similar authorities in their regard. They are doing the same thing with their tramway schemes; and even as regards street improvements and river crossings, they are incurring some sharp criticism for wanting to do at once too much and too little. The only explanation that adequately accounts for this state of things is the presence in the Council of too many small men. There are some good men on the Council and among the staff; but there must also be a number of not very wise busybodies, who have too much influence on the Council for its good. Unless this mischievous element is got rid of or reduced to impotence, it will end in wrecking the Council. It is a very paltry way of treating the gas question, for instance, to take out the last and least of the recommendations of the Powers of Charge Committee, tack it on to the old portable photometer project, and ask Parliament to legislate upon this brace of matters alone. Spring Gardens driving to Westminster Palace in a coster's barrow! That is about the size of it. The busybodies must be doing something to worry the Gas Companies, among the other objects of their attentions. They cannot leave Parliament to act upon the recommendations of the Committee; and they pick out just that suggestion which offers them a chance of posing as the friends of the poorer class of consumers. It is a cheap brand of cleverness. The pity is that the County Council do not as a whole see that, in taking up so small a pinch of the great subject of gas regulation, the power of their legislative engine is worse than wasted.

Parliament, the Government, and the Board of Trade will have bigger business to dispose of in the proposals of the Bills of which the Gaslight and Coke Company and the South Metropolitan Gas Company have given notice. The former measure will apparently be a replica, with some additions, of the ill-fated Bill of last session. The latter, judging from the formal notice, is an outcome of the recommendations of the Powers of Charge Committee.

That is to say, it makes arrangements for the transfer to the Company of the southern area and works of the Gaslight and Coke Company, formerly part of the undertaking of the London Company. It must be supposed that the two Companies concerned were advised that their existing powers did not cover the proposed severance, which, obviously, is altogether a different thing from the amalgamation of complete undertakings. It would be interesting to know just how far the two Companies are agreed on this matter.

The second proposal of the South Metropolitan Bill is for an alteration of the illuminating power, standard price, and variation of dividend enacted by the Company's Act of 1896; "and in lieu thereof to establish a variable standard "price dependent on a variation in the illuminating power, "with an increase or decrease of dividend dependent on "the decrease or increase of the price of gas supplied, and "of the illuminating power thereof." This is a sporting offer, which will have the effect of reopening the whole question of the operation of the sliding-scale; and so, of course, the modified sliding-scale suggested by the Powers of Charge Committee may come into the discussion. This was so favourable to the South Metropolitan Company, by reason of the lowness of their selling price, that the Directors do not attempt to hold out their hand for it; but what they do propose will have the desirable effect of shaking up the Gas Referees and the different authorities interested over the practical question of the connection between the legalized conventions of gas photometry and the true interest of the consumer in the character and price of his gas supply. No more serious question could be raised in the whole range of the contact of the British gas industry with the interest of the public in the supply of light, heat, and power.

Next, the Company seek powers to regulate their coin-meter supplies; to amend the form of the Company's published accounts so as to distinguish between actual and nominal capital; to provide a railway connection for their East Greenwich works; and to make a special issue of new capital for the purchase of the southern district and works of the Gaslight and Coke Company. All this constitutes a big Bill; and the proceedings respecting it in Committee, and possibly in one or both Houses as well, will be fraught with most serious interest. If the proposals as sketched are legalized, it will mean a revolutionary change in the economics of gas supply in the United Kingdom—called for, it may well be argued, by the vast alteration that has already come over the utilization of gas by the public since the period when coal gas was only employed for lighting, and the apparatus of photometry bore an intimate relation to the best means of lighting by gas at the command of the consumer. Parliament will be asked whether what began as a test should be perpetuated as a tie. The reply will be momentous.

The Wandsworth Gas Company and the London Building Act.

It is wary walking through the mazes of Building and Public Health Acts, though one may have the frail support of a Special Act to lean upon. There has been recent occasion to call in question the sufficiency of the latter kind of defence of a Gas or Water Company against the statutory battery of a Local Authority. In our "Legal "Intelligence" to-day, however, we are able to record an instance of a Gas Company's successful resistance to a Building Act—and that the London Building Act of 1894, administered by the London County Council. At first sight, this triumph strikes one as being little less than "prodigious;" but the question is to be considered by the letter of the law. The facts are a trifle complicated. The Wandsworth and Putney Gas Company wanted to build a purifying-house at a street corner; and this raised the point of the statutory alignment of the building frontage. The regulation of frontage lines is specially provided for in the Building Act, which prohibits the erection of new buildings nearer than the prescribed distance from the centre of the roadway. The Gas Company's new building admittedly came within this distance; but it happened that the site was their own, by Act of Parliament, to do as they liked with. This statutory right antedated the Building Act, 1894, under which the proceedings were taken. The real question was as to which of the two inconsistent rights should prevail, having regard to all the circumstances. It is unnecessary to dilate upon the inequality of the merits of the two sides to the question at issue, though something might be said about the pedantry which raises so much fuss about the alleged encroachment on the statutory building line of a poor alley by the riverside, and yet cannot prevent the spoiling of a once magnificent line of arterial thoroughfare like the Marylebone Road. In this case, the Company claimed special powers to erect on the site "such gas-works as they think fit." There was no getting over this sweeping, yet particular enactment. Moreover, the Building Act itself professed not to take away, or affect in any manner, existing statutory powers of a Gas Company. The Company took care to show that in what they were doing they were impelled by sheer necessity. This evidence met the point of the Sutton gasholder case. The Magistrate held that he was bound by other two cited cases which really turned on the same point—that a statutory undertaker has a preponderating right to do whatever may be necessary to enable him to fulfil his various obligations. If a Railway Company are authorized to build a station at a certain place, the Local Authority are debarred from coming afterwards and complaining that the necessary station buildings transgress their general regulations. The most curious point of the present judgment is that it apparently flatly contradicts the finding of the Court in the case of the London County Council against the South Metropolitan Gas Company, in regard to the erection of a coal-shed at Rotherhithe (see "Journal," Vol. LXXII., p. 1303). The two records must be left to answer one another.

The Price of Coal and Miners' Wages.

On p. 1260 we give some extracts from the recently-issued Board of Trade returns. From the tables there appearing, it will be seen that the price of coal, in the district for which 1899 figures are available (and, it is quite safe to assume, in all other districts), was at the end of September rapidly approaching that ruling in the years 1890 and 1891; indeed, there can be little doubt that it has by this time reached that figure, for during the past six weeks the demand for coal has certainly exceeded the supply, and prices have been steadily hardening. Of this fact we receive evidence daily; and we are assured that coal contractors are actually offering those whom they have undertaken to supply a price—of shillings, not pence—per ton if buyers will cancel contracts made six months ago—an offer little likely to be accepted unless buyers should chance to have over-purchased. Gas companies are likely to experience (they are, indeed, already reported to be experiencing) some difficulty in obtaining delivery of the coal they have bought at the time they want it, and greater difficulty in buying more if they happen not to have negotiated all their requirements. In view of this state of the market, it is not to be wondered at that wages are steadily rising, and that miners should be putting forward claims for still higher rates. It is stated that in some parts of the country there is at the present time an absolute dearth of men to work in the coal pits, especially in those districts farthest from the large cities, and that many collieries would gladly pay more than the current rate of wages in order if possible to obtain more hands, were they permitted to do so by the Owners' Association. This condition of high wages and scarce hands is reflected in the returns of the Board of Trade as to the state of employment during October. The percentage of unemployed as returned by the Trade Unions is lower than at any time since 1889. The percentage of men employed in coal mines who were working full time has risen from 25 per cent. in October last year to 33·7 per cent. this; and 137,000 miners received increases in wages during the past month. These facts will undoubtedly be in evidence in the balance-sheets of gas undertakings for this and next half year; and it will be interesting to watch for indications of the "intelligent anticipation "of events" which is of such great importance and value to the gas manager.

The Educational Work of the American Gaslight Association.

By the courtesy of Mr. Walton Clark and Mr. A. E. Forstall, the Chairman and the Secretary of the Trustees of the Gas Educational Fund of the American Gaslight Association, we have received copies of the report of the Trustees on their proceedings, and also of the questions and answers set at the last examination. The arrangement made in regard to this matter was that the educational work should be carried on for a period of at least five years from the commencement in 1895. The method

adopted was to form a Correspondence Class, composed strictly of employees in gas-works; the only condition for admission being endorsement of the application by a member of the Association or subscriber to the fund. There are two sections of the Class—the Advanced, composed of those who began their studies in 1895; and the Second, consisting of the later comers. As it has been decided to limit the course to three years, the original members of the Class will pass out as graduated at the end of this year, and a new section enrolled. Afterwards this will be done every year, so that there will be three sections in being at once. The method of instruction followed appears to consist in sending out quarterly lists of questions, twelve at a time; the students being required to return their answers within two months. The answers are looked over carefully by the Secretary; and a letter criticizing his work is sent to every student, with the answers prepared to the same questions by the Trustees. If a student does not answer his paper, he forfeits his membership of the Class. The roll of active members stands at 19 in the Advanced Section and 81 in the Second Section. These students are said to show great interest in the work, and to devote considerable time to the preparation of their answers. It is obvious, from this statement, that the work thus effected is not examinational, in the ordinary English sense of the term. It is not necessarily the worse for this; our English system of examinations being open to considerable objection. There is much to be said for the plan of allowing—even encouraging—a student to make use of any and every source of information at his command for preparing his answer to a question, and take his time over it. The result will be to show his intelligence; while he will get to know more of the rights of the subject than if he is merely challenged to answer on the spur of the moment. Of course, there can be no degrees or prizes won in this way; the only patent reward of the conscientious student being the Trustees' certificate at the end of the course. This document, however, would be personal to every student; and it might be so expressed as to give a good account of his quality.

Mr. Forstall and his associates in conducting this Class are devoted to the work; and their circulars to the students show a laudable anxiety that the answers shall be soundly based on a clear and sufficient knowledge of the reasons for the practices involved. It is not for us to criticize the critics, by calling in question the pointedness and appositeness of the papers set, or by discussing the official answers. Enough to say that the American gas manager seems to have to deal with most of the familiar annoyances of his British fellow-worker, and does it in much the same way. High praise is also due to the pure, grammatical English in which the Trustees convey their teaching, which is an influence that must operate to prevent their students from succumbing to the temptation to use the vile jargon that too often obscures the meaning of writers in some American technical publications.

Sir J. Wolfe Barry on Street Traffic.

In his Presidential Address to the Society of Arts, Sir John Wolfe Barry returned to his favourite subject of the congestion of traffic in the streets of London, and its remedies. He deserves great credit for devoting himself to so useful and important, though so thankless, a cause. It would take the London County Council and all the Metropolitan Municipalities a whole year of weekly sittings to grapple with the points of this address. The most serious consideration of them all is, what can be done to assist the traffic in the central streets of a great Metropolis, when everything in the way of railway and tramway extension only brings daily more and more people into the old main thoroughfares? What, for example, can be done for Hyde Park Corner, Piccadilly Circus, Ludgate Circus, Wellington Street intersection with the Strand? These happen to be some of the most congested London *nuclei;* but every great city has its own, and the problem is always the same. Whatever the growth of the town in population and business, the old streets and their intersections remain of the same dimensions and carrying capacity. Here and there some improvement in the way of widening may be effected; but there are always constricted places, and above all crossings, where the traffic is practically at a standstill in one respect or another all through the busy hours. Sir J. Wolfe Barry has made a declaration of his faith in the relieving effect of parallel roadways; and with reason, as the enormous service of the Thames Embankment to the Strand line plainly shows. A year ago, however, he had no plan for negotiating the crossings. Now he suggests a system of sunken roads, or tunnels—in some places viaducts—not all of which would of necessity be very costly works. Whenever any street improvements of this character are in question, somebody is certain to introduce the subject of subways for gas and water mains, and to offer the sapient suggestion that the Gas and Water Companies ought to be made to bear a goodly proportion of the expense. This is all very well; but these things have to be done with due regard to reason. No important new thoroughfare in a central situation is made without subways nowadays; and Gas Companies, at any rate, are always willing to co-operate with the Highway Authorities in making this and other arrangements for facilitating the retention of the road surface for its proper use. This is a matter that might be profitably discussed at gas managers' meetings.

The Canker of Joint-Stock Company Promotion.

In the course of his Presidential Address to the Institution of Electrical Engineers, Professor Silvanus Thompson gave expression to a grievance which goes to the root of much that is frequently heard about the evils of joint-stock company promotion, and also the encroachment of German enterprise upon English markets. The subject-matter of the grievance is not more electrical than it is gas, or of any other technical order. It is the question of the financing of new inventions in this country, which is of a most unsatisfactory character. "Nothing is more "familiar to those who have to deal with new inventions "than the ever-recurring difficulty of getting them financed "upon a sound basis. Supposing a capital of from "£10,000 to £25,000 is required to put a thoroughly sound "invention on a commercial basis, the inventor must "either raise the necessary capital privately among his "own friends, or put the business in the hands of a pro-"moter, who will want to bring it out with a capital of at "least £100,000. In other words, it is almost impossible "to find a middle course between a purely private affair "and an over-capitalized swindle. Unfortunately, we "have not in this country any organization corresponding "to the industrial banks of Germany, to the enlightened "management of which could be entrusted the financing "of sound schemes on a moderate scale." Perhaps some magnate of commerce and finance will deign to notice this challenge, and consider it in the proper place for thoroughly elucidating the subject. Some people consider that the gambling element in joint-stock enterprise, which leads to such malpractices as are gibbeted by the Lord Chief Justice, is due very largely to the cause mentioned by Professor Thompson. Others believe that the intelligent use of capital to develop invention would do more to save British trade from the rapacious foreigner than all the technical education possible to be had. What is the good, say, of educating a native inventive genius, only to hand him over as a prey to the promoter? If the proper people were to get up a conference of experienced men in this respect, and if those who know most would tell the half of what they know and have been through, the eyes of the world would open wide.

WATER AND SANITARY AFFAIRS.

It is only natural that the editorial opinions put forward in a publication devoted to special subjects should be accepted by the general public with a certain amount of caution, as emanating from parties who may be supposed to be biassed on the side of those who are pecuniarily interested in the matters under discussion. Consequently, any enunciation by us of views to the effect that the present sources of water supply for the Metropolis are adequate, if the water is properly conserved and used with discretion, to meet the requirements of the inhabitants for many years to come, and that the carrying out of a gigantic and costly scheme for bringing water from far-distant Wales is unnecessary, would be regarded very much in the same light as would the utterances of counsel briefed for the defence of a particular cause. It is therefore gratifying to find that some at least of the London newspapers have lately put forward opinions on the water question—obviously formed after a thorough study of the subject—in striking

contrast to the views expressed by the "Wales-at-any-"price" party; and it is regrettable that their remarks are not likely to be read by many who might benefit from their study. It will be remembered that during the drought of the past summer, but more conspicuously in that of 1897, "The Times" made special efforts to lay before the reflecting public the facts in regard to the trouble at the East-end—a matter about which there was a great deal of sensational, not to say untruthful, writing in the papers read by the masses. More recently, the "Morning Post" has been devoting a large amount of space to a series of well-written articles on the London Water Supply; and the question was discussed in the leading article of the "Builder" for the 11th inst. The writer in our daily contemporary has treated the subject so exhaustively that it would be impossible to follow him here; but it will be of interest to call attention at the present juncture (seeing that the London County Council have taken the first step in the direction of bringing their Welsh scheme again before Parliament) to his concise method of stating the advantages and disadvantages of that project and the Water Companies' scheme of storage reservoirs in the Thames.

He says the point in favour of the former is the provision of an alternative supply of pure water; those against it are the distance of the source of the water, possible danger from its softness, provision largely—perhaps absolutely—in excess of the requirements, and interference with an alien watershed. On the other side, the advantages of the Companies' reservoir scheme are cheapness—an important consideration—propinquity of source, and possibility of gradual development as needed; whereas its disadvantages are that the Metropolis would be practically dependent upon a single source of supply liable to pollution. Of course, by "single source" is meant the Thames; but this is entirely leaving out of consideration the stores of water still available in the chalk. All things considered, however, we venture to think these so-called disadvantages are far outweighed by the advantages. We do not propose to deal with the financial aspect of the question; because if the Welsh scheme, expensive as it most certainly would be, can be shown to be absolutely necessary for London, the cost of it will have to be borne by the ratepayers, very much as the expenses of necessary wars have to be borne by the people at large. Our point, however, is that, in view of the proposals of the Water Companies for meeting the future requirements of the Metropolis, the scheme is not immediately necessary; and we think that, on the whole, our contemporaries are with us.

But supposing the necessity for some extended scheme of water supply for London is clearly demonstrated, and the advisability of the acquisition of the Companies' undertakings proved, is the County Council the right body to be entrusted with the carrying out of this important work? We think not. The triennial reconstitution of the Council would be detrimental to that continuity of settled policy which is necessary for the efficient control of the water supply of a great town. The Government doubtless held this view in 1896, when they introduced their Bill for the constitution of a Board for dealing with the supply of water to those portions of the Metropolitan Counties situated within the Metropolitan Water Area. The suggested constitution of the Board was generally regarded as fair, and the measure, on the whole, as one calculated to lead to the solution of a difficult problem. But it did not become law. Nevertheless the establishment of such a body seems to us to be the best way of settling this vexed question, assuming that the water supply is to be taken out of the hands of those who are now responsible for it. Water Boards are being favourably regarded by Parliament, as was evidenced last session in the case of the Derwent scheme; and a project is now on foot for obtaining legislative sanction to the constitution of a Joint Board, composed of several District Councils, to control the supply of water in a large portion of Essex, embracing Ilford, Romford, Barking Town, and other places. On this matter, we may revert to the articles referred to in a preceding paragraph to point out that the writer in the "Morning Post" considers that the Metropolitan Water supply is of such importance as to make its control a question for the whole nation. He strongly advocates the conversion of the stock of the Companies into a National Trust, "on terms "of justice to the present holders." But he goes much farther than this. He would make the Trust only the beginning of a "complete and ordered control of the water "of England;" its Board of Management being a Department of the State, to whom should be referred "all disputes "arising from the rush for remaining watersheds." This suggestion, it may be remembered, was thrown out by Professor Henry Robinson at the last congress of the Sanitary Institute; his idea being that the entire country should be mapped out into watershed districts under the supervision of a State Department. Certainly, if some such body as this had to deal with the question of furnishing an additional supply of water for the Metropolis, they would necessarily endeavour to utilize to the fullest extent the untapped sources lying close at hand, within its own watershed, before advising an enormous outlay in bringing water of not altogether unquestionable quality from another in a distant part of the country.

The parliamentary notices which have appeared during the past few days show that the question of the water supply of London will figure conspicuously in the Private Bill business next session. In addition to the Bills to be reintroduced by the London County Council, the East London Company intend, as was quite expected, to renew their application for power to construct further storage reservoirs and other works connected therewith in the counties of Essex and Middlesex, and, with the sanction of the Local Government Board, to take additional water from the Thames or its tributaries, or other sources, "through their own or other intakes." The Chelsea Company will seek authority to purchase further lands, and to have some doubts removed which have arisen as to the validity of certain shares and stock; also to make provisions in regard to their dividends. The Lambeth Company wish to be empowered to construct new reservoirs, aqueducts, conduits, or lines of pipes, in Surrey. Another notice bearing upon the Metropolitan Water Supply is that given by the Lea Conservancy, who will apply to be dissolved and reconstituted. But a far more important matter is an announcement of an intended application for an Act to enable the Local Government Board to require the Metropolitan Water Companies to submit schemes for further storage reservoirs in the Thames Valley; the Companies to have power, with the sanction of the Board and of the Conservators, to take an additional quantity of water from the river and its tributaries at times and places to be approved or prescribed. It is proposed to repeal or vary the provisions of the Staines Reservoirs Act of 1896, the Southwark and Vauxhall Act of 1898, and the Thames Conservancy Act of 1894. The measures proposed in the notices here briefly referred to will be dealt with at greater length when the complete list is given next week.

In an article entitled "Rural Water Supply" which appeared in the last number of the "JOURNAL," what Americans would call the "true inwardness" of the case was plainly stated. It is eminently satisfactory to find our contributor's contention emphatically confirmed by so excellent an authority as Mr. H. H. Asquith, M.P. Speaking at St. Martin's Town Hall, the right honourable gentleman took the very line which was set forth in the article referred to, and argued that the real hindrance to sanitary reform is to be found in the lethargy of the Local Authorities. Mr. Asquith's speech covered the whole ground of which the question of rural water supply forms part; and if he and those who share his views will be at the pains to look farther afield, they will certainly discover that lamentation is justified quite as much by the state of things in country districts as by that which prevails in London and the large towns. While, as to the specific problem of water supply, the rural, as distinguished from the urban, position is, for obvious reasons, the more serious. Mr. Asquith, apart from his Parliamentary experience as a public man, apart also from knowledge acquired in the profession of the law, has had the special advantage of holding office as the head of the Home Department; and he absolutely repudiates the suggestion that all blame rests with the central authority. This much he asserted with considerable emphasis, and pointed out, as the writer of the article did last week, that the statute-book does contain large and ample provisions which, if they were properly enforced by a capable local authority, stimulated by an active public opinion, would considerably mitigate some of the worst features of the gloomy pictures which the "Daily News" has lately portrayed for the education of its readers. If, contends the ex-Home Secretary, you could once get "high-minded, zealous, energetic, and disinterested men"

upon your local authority, depend upon it you would have done much towards accelerating a solution of the present problem. But the "if" involves a great deal; and even Mr. Asquith, with all his ability, will find it difficult to draw an appreciable number of "incorruptibles" into the, to them, distasteful atmosphere of parochial politics. The late Chairman of the Lambeth Vestry, who also was one of the speakers at St. Martin's Town Hall, roundly declared that he had found the County Council and the Home Secretary "broken reeds." Certain it is that District and Parish Councils are, in too many instances, proving themselves broken reeds; and it cannot be expected that a system thus supported can stand any firmer than a house built upon the sands.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1263.)

THERE was nothing at all exciting to be found in the Stock Exchange last week. Of war news there was practically nothing; and this was regarded as almost the best news we could have just at present, offering a fairly probable show that our troops may hold on tight where they are until relieved. So, thus encouraged, things in most departments ruled pretty firm, although business was not very brisk, and there was not absolute freedom from fluctuation. Consols were the only conspicuous exception, as they closed at a slight reduction; but this was more the result of monetary movements than anything else. With this exception, prices all round exhibit a fair advance. The Money Market was very firm; and the Stock Exchange settlement helped to make it so. But after Thursday the tendency evidently became easier. In the Gas Market, there was at last some slight sign of more activity; but it did not come all at once, for the earlier part of the week was quiet indeed. Another favourable feature was that the tendency seemed to be improving; and some moderate advances were effected in quotations, with only one movement the other way. In Gaslight issues, the ordinary opened rather inanimately at 105½. But later on it developed into a degree of briskness; and the closing mark on Saturday (its busiest day) was 107. Transactions in the secured issues were quite moderate, and prices were not remarkable either way. The same may be said of South Metropolitan, which jogged easily along without offering to change. Absolutely nothing was done in Commercials; stock seemingly being very scarce in the market. The Suburban and Provincial group was left very much alone; but a parcel of Crystal Palace being let go at a cheap rate, the quotation was put down a couple of points. In the Continental Companies, business was not over and above plentiful; but they all showed a marked recovery—Union being at the head of the movement, with a gain of five points. Among the undertakings in the remoter parts of the world, there was no feature calling for notice, except the reduction in the dividend rate in Monte Video. The Water Companies continued in cheerful mood, and made further advance in value; Lambeth and Southwark each scoring a rise.

The daily operations were: Gas stocks were excessively quiet on the opening day; and prices made no move. In Water there was an immediate improvement; Lambeth advancing 2, and Southwark 1. There was a little more movement in Gas on Tuesday; but still no change in quotations. In Water, Southwark was ½ higher. Activity in Gas set in on Wednesday; and prices hardened for the most part. Imperial rose 2; but Crystal Palace fell 2. In Water, Lambeth gained 2. Thursday brought somewhat of a lull in activity; but the upward move progressed. Union and Imperial moved up 2 each, and European ½. Southwark Water rose 1½. Friday was strong, though quiet; and Union went up 3 more. Lambeth Water improved 1. Saturday was strong and active; but quotations made no further change.

ELECTRIC LIGHTING MEMORANDA.

Professor S. P. Thompson on the Position of Electrical Engineering—The Cost of Electric Light Wiring—The Pattern for Electric Tramway Traction—The "Statist" on Electricity Works Depreciation.

PROFESSOR Silvanus P. Thompson, as President of the Institution of Electrical Engineers, addressed the members last week on some aspects of present-day electrical engineering. If the critical kind of Presidential Address is of any use at all, it is conspicuously so when the subject-matter is a new development of science and industry. Electrical engineering, in one sense, cannot change radically from year to year, because it is only an application of natural laws which are immutable so far as we know them. At the same time, inasmuch as all practical engineering is largely experimental, it necessarily changes its methods and appliances incessantly with the advance of speculation and the growth of experience. Professor Thompson was therefore performing a useful office in acting as watchman and calling the time of day for the members of the Institution. Among other things, he registered the fact that the improvements of gas lighting during recent years have made the competition of electricity with gas very severe—that is, for electricity. He remarked it as singular "that the properties of the rare earths which formed the foundation of the invention of the Welsbach mantle had not been turned to account in electric illumination before the invention of the Nernst lamp—for the commercial introduction of which electrical engineers are still waiting expectantly." This passage has a sharp sting in its tail. Where is the Nernst lamp? and why does it hide itself from the vulgar gaze? As for the failure to use the rare earths in the construction of other forms of electric lamps, it should not be forgotten that it was in the search for an electric lamp that Dr. Auer von Welsbach found his gaslight. Every other chemist who has had the means of experimenting with the rare earths has been busy on the same lines; but this particular field of physical chemistry, or chemical physics, seems barren.

Professor Thompson reminded his hearers that while they were seeking for a better electric lamp, one of the greatest obstacles to the commercial exploitation of any lamp—the cost of the house-wiring—remained unmodified by the advance of science. As he truly said, the reduction of the high prime cost of electric house-wiring would be a far more important factor in the working out of the economic struggle than a new lamp. "Could electric house-wiring be carried out as simply and cheaply as the putting in of gas-pipes, an enormous advance might be confidently expected; but so long as station engineers and fire insurance inspectors insisted on having both wires insulated, and refused to allow an uninsulated or semi-insulated return, so long would this advance be delayed." We should like to feel assured that Professor Thompson was speaking quite by the book in this regard. If he knows of a way of wiring a house which would really and truly be considerably cheaper than, while quite as safe as, anything that actually satisfies the Fire Offices, he ought to put it at the disposal of the Free-Wiring Agencies already at work, or start another to exploit it. Meanwhile, is it correct to classify common electric wiring as actually dearer than iron barrel gas-fitting? Why should it be so? It would not surprise us to be told that, in places where domestic electric lighting has been made popular—as, as for example, in Norwich—it has been found possible to do the fitting at a cheap rate. Of course, in the West-end of London the case is likely to be different. But then, West-end gas-fitters are not exactly cheap workmen.

A very good portion of Professor Thompson's address dealt with the vexed question of the application of electric power to street railways. Unlike most electricians who speak in public on this subject, Professor Thompson refrained from joining in the parrot-cry of admiration for American practice in this regard. Not even the President of the Institution of Civil Engineers was able to take up a fittingly independent standpoint from which to view American and English systems of tramway working on their merits. One is sick and weary of the senseless repitition of jibes at "British red-tape" obstruction, "lack of enterprise," or what not, which have nevertheless, as Professor Thompson admits, served to keep the disfiguring overhead trolley wires in abeyance, and have preserved the streets for the people. It is to Switzerland, said Professor Thompson, rather than to America, that we should look for guidance in the application of electric power to the service of heavy lines. It is, indeed, high time that professors of electricity and engineering turned their gaze from American street railway practice—in the second-rate cities, at that—and fell in with the reasonable ideas of those who do not hold the running of tramways by electricity to be the sole end and object for which streets exist.

In the issue of the "Statist" for the 11th inst., there appears a weighty article on electric supply companies and the depreciation of assets. A year ago the same journal sounded a note of warning that the companies engaged in this business had as a rule inadequately protected their capital assets. After the operations of another twelvemonth, our financial contemporary returns to the subject, only to repeat with emphasis its previous alarm. The statement is deliberately made that the statistics "only too clearly show that in the majority of cases depreciation has not been dealt with on an adequate basis; and if this policy be continued, it cannot fail adversely to affect the subscription of further issues of capital." This is how the mischief is likely to affect companies. In the case of municipal undertakings, the evil will be that the ratepayers will be unable to defend themselves by letting the business alone. In its table of electricity supply companies showing the proportion of depreciation allowances to dividend payments, the "Statist" gives ample proof in support of the contention that, "in the cases of the majority of the companies quoted, the appropriation of the profits unduly favoured the dividend account, and left the depreciation fund a sum wholly disproportionate to its requirements. Some of the appropriations, indeed, point to a flagrant disregard of the first principles of finance." We have not space for the present to follow up this "Statist" article, but hope to return to the subject, which, it may be noticed, is dealt with in an essay appearing in another column. It is impossible to exaggerate the importance of the considerations centring in the word depreciation; and everybody concerned for the rectitude of company and municipal finances, must be anxious above all things that the accounts shall not conceal any "secret" that can possibly prove detrimental to the preservation of the investment.

PROFESSOR R. H. SMITH ON THE LAWS OF PROFIT.

THE question, What is profit? is easier asked than answered with exactitude in respect of any manufacturing concern or supply undertaking. Especially is the answer to this question likely to be confused in the case of municipalized enterprises carried on under the sway of mixed motives. In view of the great and growing need for the dissemination of sound views upon this subject among the British public, we take this opportunity for discussing certain "laws of profit" laid down by Professor R. H. Smith in recent issues of the "Engineer." It cannot be gainsaid that members of local authorities in general, and not a few directors of public companies, require trustworthy guidance to the right understanding of the meaning of the term "disposable profit." Professor Smith assumes no simple task in attempting to reduce the correct allocation of profit to a matter of rule. Yet it is clear, from many deplorable examples of blundering in this regard, that plain citizens who go on boards of directors, or get elected to trading local authorities, badly need some reliable principle to go by.

Professor Smith arrests attention at the outset of his articles by declaring that those simple people who may be led away by the glitter of modern financial operations to believe that profit can be made out of "management of affairs," are mistaken; and that the only two actual sources of profit are "cheating and work." The reference here is obviously to those vast "combination" schemes of which so much has been heard of late years, whereby subscribers of capital were supposed to turn their money many times over by "pioneering" something or other—electric lighting, bicycles, horseless carriages, and what not. In the case of profits made by useful and well-managed work, the first point to be decided is the amount of the necessary, expedient, and prudent deductions from the gross amount of the credit balance on revenue account. Where this is not properly done, dividends and interest may get paid out of capital. This proceeding is justly scouted as indefensible—when it is recognized; but Professor Smith remarks that it is done far more frequently than either proprietors or administrators are aware. "The fact is obscured or altogether hidden from sight by the process of silently ignoring depreciation." This is going straight to the heart of the subject.

Depreciation is a "word of fear" for municipal managers of electricity supply undertakings. Yet, as Professor Smith emphatically states, "if a dividend be secured by omitting fair and proper provision for depreciation, it is an undeniable fact that such dividend is wholly or partly paid out of capital, because fairly-estimated depreciation is, without a shadow of doubt, an actual and real decrease in the value of the capital." He cites one item of depreciation—namely, "antiquation" of design or pattern—as something only too easily ignored; while it is at the same time of far more importance, in these days of rapid improvement of methods and introduction of novel and better processes, than it used to be. All kinds of work, it is pointed out, demand initial expenditure before any profitable return is possible. This initial outlay is of two kinds—capital and current. The smaller the initial outlay before business is begun, the better, of course. Afterwards, the capital outlay and current expenses must show gradually decreasing ratios to revenue. Professor Smith plots these elements in graphic diagrams, for which we must refer to the original articles. They are not required for our present purpose.

Out of the revenue of the undertaking has to come the working expenses, and also the capital charges—depreciation, insurance, sinking fund, interest, reserve fund, and dividends. It will be observed that the item of depreciation comes first; and the dividend, or surplus profit, is the last claim to be satisfied. Professor Smith declares that it is not his purpose to discuss the very debatable subject of depreciation, repairs, and maintenance, "further than to insist strongly that the accounts do not show the true state of the business, unless they have entered in them a fairly estimated amount for depreciation; and that in most technical work such fair depreciation includes more or less antiquation." The insurance, and the whole or a part of whatever reserve fund may be provided, are described as "really provisions against unforeseen, accidental, and intermittent depreciation."

Those of our readers who are interested in manufacturing concerns, should master Professor Smith's method of investigating the relations of all charges to the available remuneration to capital. ("See Engineer," Sept. 8, p. 231.) These matters need understanding also by those managers of gas and electricity supply undertakings who actually do, or are thinking of doing, "their own work," in various branch departments. Nothing is more common than misunderstanding of the true cost of home-made articles, as compared with the market prices. Of course, it is not to be said that it does not come cheaper to do some things on the spot, or "at home" as it were, than to buy them; but when this is done upon anything like a considerable scale, the difference is likely to grow less, even if it does not fall on the other side. The item of "working expenses" is the unsuspected source of this influence. Working expenses is the charge that comes after the cost of raw material and the labour. Professor Smith considers seven values of this charge, but admits that the percentage is seldom so low as 20, and rarely as high as 80. It is not bad working if, in any kind of engineering establishment, it is as low as 40 per cent. One of the most valuable results of Professor Smith's method of plotting the elements of business operations in diagrammatic form, is to emphasize the truth of "how extremely difficult it is to make remunerative any industry in which only a low ratio of gross revenue to capital outlay can be reached." With the gross profit on capital outlay under 8 per cent., "it is almost impossible to extract any dividend above the borrowing rate of interest out of it;" and it is difficult to do so when the rate is less than 10 or 12 per cent. It is instructive to apply the light of this rule to the published accounts of electricity supply undertakings.

Professor Smith does this in the case of several of the great national industries. He admits, however, that his statistics are not very fresh. Still, the result is instructive. In shipbuilding, the turnover was some years ago 175 per cent. of the capital employed; in several classes of mechanical machine construction it was about 50 or 80 per cent.; in cloth manufacture, 150 per cent.; in iron and steel making, 100 per cent.; in the shipping trade, 90 to 100 per cent.; and in coal mining, it ranges from 25 to 100 per cent. "Gas-works used to reap 30 per cent.; but their revenue has now gone down to about 25 per cent. of their capital, although in individual cases they still get 40 per cent. British railways average only about 10 per cent.; and water companies about 8½, while some are even below that. Electric lighting as it exists to-day yields in Britain an average revenue of 12 per cent. on capital outlay; the mean for companies being 12·8, and for public authorities 10·8, while in a very few cases it obtains as much as 16." The above quotation is open to question. Averages are apt to mislead, unless there is a reasonable degree of uniformity among the included figures. In the case of electricity supply, this necessary condition is wanting. If the prosperous London Electric Lighting Companies and the handful of big municipal undertakings were excluded, the average return on the vastly greater number of small concerns of the kind would appear much less favourable. A high average of prosperity is not to be deduced for a group comprising two or three millionaires and many paupers.

Professor Smith's method also applies to the determination of the rate at which increased capital outlay is permissible to meet the demands of a growing business, or to save working expenses. It is quite true that money may often be well spent for the saving of labour or material; but this outlay has a limit. "As perfection is more nearly approached by such expenditure, it, of course, becomes increasingly difficult to effect further improvements by spending still more on capital account." There is a condition at which it becomes more profitable to spare capital than to spend it. This is easy to perceive; but the mathematical expression is anything but simple. Incidentally, it may be remarked that the mathematicians ought to be very grateful to Professor Smith for showing how the resources of their science may be made commercially useful. He has given Cambridge a new lease of life.

These problems of maximum economy have been attacked from another point of view, which Professor Smith challenges as liable to mislead—namely, from that of making the gross profit a maximum without regard to the ratio of that profit to the capital employed. He accuses Lord Kelvin of falling into this error in his calculations of the most economic current density to employ in electric conductors. This ignores the amount of borrowed capital employed. Professor Smith argues that the borrowed capital of joint-stock concerns can hardly go above two-thirds of the share capital; and whatever proportion it may take, the main interest of the proprietors is to make the whole gross profit, including interest on borrowed capital, bear as great a ratio as possible to the whole capital. "This comes to the same thing practically as making the net profit, after paying interest on borrowed money and all other charges on capital, bear as great a proportion as possible to the whole capital employed." Two equations and a diagram are given to show how this may be done.

After all, Professor Smith admits that the whole question of profit revolves round that of depreciation; and personally he believes that, in order to secure the domination of sound industrial and commercial principles, no other question requires at the present time more careful and vigorous investigation and public discussion than this of what is fair and reasonable depreciation. This is a very serious matter; and until it is satisfactorily disposed of for any kind of business, those whose money is engaged in the business cannot be assured as to its solvency. At the same time, it must be conceded that the whole question is a very deep, far-reaching, and difficult one, not to be disposed of off-hand by any single authority.

ELECTRIC POWER MACHINERY.

SOME time ago the question was put in these columns to gas engineers, as to whether they had taken into consideration the possibility of applying electrical power distribution to the various mechanical operations of gas manufacture. The query was suggested by a contribution of Mr. James Swinburne to the "Engineering Magazine" for August; and that no time was lost on our part in taking up Mr. Swinburne's challenge, is proved by the fact that our essay appeared in the "JOURNAL" for Aug. 15. Since then, members of the Institution of Gas Engineers visiting the Continent have seen electric power used in the handling of coal at Copenhagen; they saw an extensive

electric power installation at one of the new wharves of the Free Port of Hamburg; and they heard of several Continental gas-works—notably, Zurich—where this method of power transmission is largely employed. It is also impossible for engineers of any order to read the technical journals of their profession without having this subject thrust upon their attention at every turn. Electrical power transmission and utilization is emphatically one of the points of contemporary engineering science and practice which no professional man who wishes to be thought "in the movement" can afford to neglect. We shall, therefore, make it our care to keep well to the fore the subject opened up in the "JOURNAL" essay of Aug. 15, until at least the gas engineers of the United Kingdom give proof positive that they, too, are in touch with the pioneers of one of the most interesting mechanical developments of the age.

It will be sufficient in the circumstances to confine the gas engineering study of the subject to the limited field marked out by Mr. Swinburne in the article referred to. That is to say, gas engineers and works managers need not trouble themselves with those abstruse and weighty problems of power transmission, in bulk and of high potentiality, which properly concern only the very first rank of electrical engineers. The proper study of works managers is as to whether or not electric power is qualified to prove a useful agent for their particular purposes, which have hitherto been served by applications of direct steam or gas power, or by the intermediate action of hydraulic power, compressed air, rope driving, belting, or gearing. As Mr. Swinburne says, and truly, hitherto British works engineers, in whom the old order of millwrights have long been merged, have never so much as entertained a thought of electric driving. The time has come when such thought must be taken. This is the central feature of the existing situation.

Works engineers must be prepared with good and adequate reasons for the methods of power generation and distribution which they individually adopt and ask their employers to pay for. With reference to electric power and the machines, or "motors," by which the current is re-converted into a working force, the general opinion of most engineers who are not electricians and have no interest in the electricity business, has been that, where they were not toys, the chief motive for their employment was advertisement. Either it was desired to make a use for the current, or the employer of the electric motor wished to appear very much "up to date." There is, of course, no harm in this kind of patronage of a system of working. Gas engineers have often put themselves to considerable inconvenience with the object of similarly advertising gas-engines. Most mechanical novelties, indeed, need a little friendly humouring in their early days, while it is still doubtful whether they will outlive their infantile ailments, and the more serious constitutional weaknesses of their breeding. Apart altogether from mere commercial interest, there is a large class of people who will spend money and devote infinite pains upon novelties to which they take a fancy; just as there are others who prefer to wait until everything is made smooth and easy. It is unnecessary to cite instances. In the fulness of time, all these artificial aids and props have to come away. Advertisement and fancy combined can only tide a novelty over a limited period of probation. The thing must take its chance, to sink or swim in the deep waters of everyday usage. So it happens now to the electric motor and its service.

At the British Association meeting, in September, the subject of electric power distribution received some further elucidation. Mr. Alexander Siemens advocated the greater use of electric power on board ship, on the ground that it is far superior to either steam or hydraulic gear. Of course, what answers for the necessities of a modern ship will do equally well for many other kinds of workshop. Discussing Mr. Siemens's paper, the "Engineer" laid stress upon some considerations attaching to electric power mechanism which do not usually appear in the ordinary run of electricians' advertisements. It may be remarked here that this suspicion of what is kept back by the authors of papers in advocacy of particular systems and appliances, is one of the most potent of all drags upon progress. If only the writers of papers would tell the whole truth about their cause! However, as regards the advantages and drawbacks of electric power machinery, Mr. Siemens is perfectly candid. An electric motor differs essentially from other motors. It is a rather delicate and peculiar piece of machinery, as our contemporary remarks, requiring very judicious handling at the best of times. "A prominent defect is its readiness to burn itself up if it is asked to do more than it is intended to do." This is a very impressive observation. In a word, it fixes upon the electric motor the reproach of being a very inflexible machine, if once its limitations are passed. In the comparative example of a steam-engine, if there should be overloading, the machine simply pulls up. If a belt has too much strain upon it, it quietly slips on and finally off the pulley. There is no destruction of valuable property. With an electric motor attached to the driven mechanism, a sudden excess of strain would throw such a pressure upon the motor that the armature might burn up and the whole apparatus be wrecked in a moment. This, then, was the "red light" for electric motor machinery.

The next contribution to the enlightenment of the engineering world in regard to the conditions of the successful use of electric machines in factories, is Mr. J. S. Raworth's paper, read before the Manchester Association of Engineers on the 28th ult. We have on previous occasions followed Mr. Raworth's utterances on such subjects, with interest and profit. Accordingly, we turned to him for guidance beyond the point at which the British Association left the question; but this time our author was more informing than instructive. He will appreciate the distinction. As a matter of fact, Mr. Raworth warns off criticism by confessing with his first breath that he "should have preferred to defer taking up the task until the world had provided us with more exact data." But what are technical papers for, if not to fill the gaps of knowledge of outsiders? Is there anything done in the world of electrical engineering that Mr. Raworth does not know all about? Here is another remarkable thing: Although the exact data Mr. Raworth would like are lacking, he yet thinks that what he can say about it "may be of some value to those who are satisfied that, at all events for their purpose, electric transmission of power is the thing they want"—which is as much as to say that this apostle of electricity prefers to preach to the converted. It is an easy, but not an inspiring, exercise.

Perhaps Mr. Raworth means no more than to warn power users that the problem in question has no master key. If the requirement is to drive a machine drill or punch at any part of an engineering or shipbuilding works, the advantages of electric distribution are too conspicuous to need demonstrating. If, on the other hand, it is a question of how the power of an adjacent steam-engine had best be conveyed to a number of machine tools next door, or overhead, the answer is not so certain. When it comes to the working of winches, hoists, elevators, coal breakers, conveyors, sifters, retort-stoking apparatus, and similar semi-detached machines, the problem grows extremely complicated. Scattered through Mr. Raworth's paper are certain admissions which should not be overlooked. A good deal depends, he says, upon the cost and efficiency of various sizes of motors. "For instance, it may be perfectly easy to show that 40-horse power may be economically transmitted by electricity, and the power reproduced at a distance by means of a motor of 90 per cent. efficiency. But if the same power is required to be very much subdivided and reproduced by motors having an aggregate cost of three times that of the motor aforesaid, and having an efficiency of no more than 75 cent., the balance may be entirely on the wrong side."

It is important to note that the electric motor is an expensive article to buy. Mr. Raworth gives the average prices as follows:—

$\frac{1}{6}$ H.P. costs	£8	10 H.P. costs	£100
1 " "	£24	20 " "	£150
2 " "	£34	50 " "	£250
6 " "	£50	75 " "	£320

A good many considerations flow out of this list. Mr. Raworth mentions one—that extreme sub-division of electric power can only be carried out by the expenditure of a large amount of capital. For instance, whereas a motor of 20-horse power is worth £150, twenty motors of 1-horse power would cost no less than £480, with the addition of at least £80 for switches and fixings. Then there is the question of efficiency. Unfortunately, there are two kinds of efficiency—mechanical (including electrical) and commercial—and there is no relationship between the two. "Your mechanic deals with figures which are the fundamentals of his education, and are subject to calculation; but the commercial man has to take account of interest, depreciation, repairs, lubrication, and superintendence. Thus it often happens that the engineer is happy, and the owner miserable; the engineer may be getting an efficiency of 90 per cent., while the owner gets no profit at all." This is a deep saying, worthy of all respect from others besides electricians.

It would be unfair to twist Mr. Raworth's paper, which was addressed chiefly to Lancashire cotton spinners and large power users, to the comparatively modest power requirements of even the largest gas-works. It is in justice to him, however, that we refer to his paper as a valuable compendium of information. Instructive it is not—as regards the special needs of gas manufacturers; but there is doubtless more to be had where the data of this paper came from.

THE STATE OF TRADE.

In his recent speech at the Mansion House (noticed in the "JOURNAL" last week), Sir Michael Hicks Beach declared that he was "not one of those who are great believers in our want of success in commercial affairs." It would, indeed, be somewhat strange if he were, at the present time at any rate. The returns for the month of October just published by the Board of Trade, bear striking witness against the theory that our commerce is being rapidly undermined by our foreign rivals, and show clearly that there is no slackening yet perceptible, or apparently near at hand, in the wonderful revival of trade which is the subject of universal comment. Last month the imports showed an increase of £5,531,600 (or nearly 15 per cent.) over the corresponding month last year; while the exports rose from £19,863,000, in October, 1898, to £23,699,000 in 1899—an increase of over 17 per cent. These increases are not merely, though they are to a considerable extent, due to the continued rise in prices, but indicate that the volume, as well as the value, of our trade has swollen considerably. This is in spite of the fact that during

the last two-thirds of October the country was at war; and it is curious to note that, considering that we are at present engaged in a war of greater magnitude—so far at any rate as the number of troops employed is concerned—than ever before, the effect upon our commerce is likely to be trivial, and is, in fact, causing great activity in many industries at home, while scarcely affecting our trade abroad.

The causes of this revival in trade are doubtless many, and are certainly difficult to fundamentally explain. But there is no doubt that we in this country owe much of the revival to the active state of American industries, especially the iron and steel trades. It is stated by the Washington correspondent of the "Daily Chronicle" that at the Illinois Steel-Works, where the pay of skilled workmen is regulated by the selling price of steel rails, the hands are now receiving from £15 to £30 per month, and that on the 1st of January next, when new contracts come into force, the minimum wages will be £30, while the maximum will exceed £60, per month. This, it is stated, and we can well believe it, will be the highest wages ever paid for that class of labour. This state of the iron and steel market is the principal factor in the swelling figures of our own trade; the total exports of metals and articles—other than machinery and ships—manufactured therefrom during last month being valued at £4,350,825, as against £2,775,409 in the month of October, 1898, and £3,053,570 in October, 1897—figures which go far to explain the demand for, and consequent high price of, coal to which reference is made in another column.

We note that it is seriously believed by men who should know what they are talking about, that when the Boers find themselves (as they will before long) hopelessly beaten, they will do their utmost to wreck the mines on the Rand and demolish the machinery. It is estimated that, should they succeed in such an attempt, the mining companies would have to spend from ten to fifteen millions on fresh machinery. This, at first hearing, sounds somewhat remote from the interests of the gas industry; but what would be the effect on the price of coal if such a further stimulus were given to the metal trades?

SECRET COMMISSIONS.

THE "Bill to Check Corruption," which was introduced into the House of Lords on the 20th of April last by the Lord Chief Justice, and commented upon in the "JOURNAL" for the 25th of that month, was read twice by the House and considered in committee and on report; but, in consequence of Lord Russell's absence from England on the Venezuela Arbitration, it proceeded no farther. In an article by Sir Edward Fry in this month's "Contemporary Review," entitled "Commercial Corruption," we are, however, informed that it is the intention of the Lord Chief Justice to present his Bill again to Parliament during next session; and that it is probable he will re-introduce it in nearly the same form as that in which it appeared after it had been amended on report. Sir Edward Fry—whose interest in the subject is well known, and who, indeed, explains in his article that he has been taken into counsel by Lord Russell, and has had a share in the production of the Bill as it now stands—has written his article with the object of giving some explanation of the scheme and object of the principal provisions of the Bill, and, at the same time, of meeting some of the objections that have been urged against it.

As our readers are aware, the Bill proposes to create a number of new offences at law, all arising out of corruptly giving, offering, receiving or soliciting a secret commission. The first question that occurs, and which the Bill does not explicitly answer, is: What is corruption within the meaning of the clauses? The reason why no attempt is made to actually define corruption is, as Sir Edward points out, easily seen. In the first place, it is always difficult to define fraud; and, in the second place, it is most unwise to attempt to do so, because one would thereby assist the would-be defrauder to know how far he could go without breaking the law.

> "There has been going on for centuries a game of hide-and-seek between the law and the knaves—Justice, with her lame foot and clumsy ways, toiling on after the deft scoundrels who seek to elude her, sometimes by swiftness of physical foot, sometimes by the keenness of their intellects, or sometimes by the narrowness of the legal mind. But the most ingenious of legal scoundrels have never persuaded the Courts to give a definition of fraud. The Courts have been always ready to declare a particular transaction to be, or not to be, fraudulent; but what constitutes fraud, or what is its precise definition, is a thing which the Courts have never disclosed, and I hope never will. No practical harm has followed, or can follow, from this want of precise definition. No man acting with real honesty has ever, I believe, been held responsible for fraud; and the Courts have been free to meet each varying change of human business or of human knavery as it arises."

In like manner it is proposed to leave the Courts to consider and adjudicate upon each individual case on its merits—having regard chiefly to the intent and effect of the alleged offence. The Bill does, however, specifically declare certain acts to be corrupt; and as the definition of a corrupt payment, in clause 3, has been amended since the measure was introduced, we give the wording of the first part of the clause as it now stands—

> "Every valuable consideration given to any agent by or on behalf of any person having business relations with the principal of such agent, not being *bonâ fide* given to such agent for and on behalf of his principal, but under such circumstances as that the same could be recovered by the principal from the agent on the ground of the fiduciary character of the agent, shall be deemed to have been corruptly given."

The amendment from the original form lies in the introduction of the reference to the "fiduciary" character of the agent. This amendment (in which we think we detect the hand of Sir Edward Fry) carries with it the advantage of adopting, in the proposed new law, a legal concept, the exact force and meaning of which past decisions of the Courts have to a great extent defined. There already exists in law a liability imposed upon an agent by the confidence placed in him by his principal, and it is proposed to brand as a corrupt transaction any payment made or offered to, or received or solicited by, an agent which, in his fiduciary relationship to his employer, that agent should, but does not, disclose to that employer. By thus adopting a definition founded upon a well-known and well-established principle of law, it is hoped that there will be little dispute or difficulty over the meaning of the clause.

As, however, it is obvious that the doctrine of fiduciary relationship does not apply to secret commissions indirectly given—say to the wife or child of the agent—a clause has been inserted enacting that it shall be a corrupt act for anyone having business dealings with a principal to make any gift or payment to the parent, husband, wife, or issue of an agent of that principal, unless it be proved to have been made with the consent of the principal, or without intent to corrupt the agent, and that there was, in fact, some reasonable and honest cause for the gift, and that it was made in complete independence of all business relations with the principal. That some such provision—somewhat akin to those of the Bankruptcy Acts in regard to the making over of property to a wife two years prior to insolvency—is necessary to make the Act effective, is obvious. It is not, we believe, an unknown thing for a wife to receive, say, a sealskin jacket for which her husband has only paid, or will only pay, by unduly favouring the firm who sent it.

The Bill then proceeds to bring within its scope shady transactions such as the case of A accepting a gift from B in consideration of giving to C some advice, apparently disinterested, calculated to benefit B at C's expense, and which advice C would not heed did he know what had passed between A and B. These sections (7 and 8) are also intended to cover the case of stockbrokers or bankers advising their clients to invest their money in some concern by which they, the advisers, are secretly subsidized. Section 9 is designed to cover the various methods by which principals may be swindled by the use of bogus invoices; the agent being thereby enabled to charge his employer more for goods he has purchased than the seller is content to receive. The Bill would further have the effect of penalizing arrangements between bankers and stockbrokers, or between solicitors and insurance companies, whereby the former act as paid agents for the latter, while their clients imagine that they are receiving independent advice. This is an aspect of the proposed measure against which the parties concerned have protested; the question being referred to at length at the recent annual congress of the Incorporated Law Society. In regard to this point, Sir Edward Fry remarks:

> "It is sometimes said that these practices are notorious and known to every one. This is a mistake. I never knew of them till lately; and I know that the same has been the case with some better informed men than myself. I knew that bankers did act for their customers in purchases on the Stock Exchange, and without specific charge for so doing; but I thought that they did so as part of that accommodation which they afford their customers as a reward for having the care of their money. With regard to solicitors, I feel sure that the practices to which I refer are not known to many of their clients; . . . and, when we remember the duty which every solicitor owes to his client, to assist the client in every way, and to take no advantage of his position as confidential adviser, it will, I think, appear that more information should be given in these cases to the client than has usually been the case. . . The procuration fees paid to solicitors are, I am informed, a very serious item in what is, I believe, called the 'loading' on the premium. . . These excessive payments for procuration thus tend to discourage the invaluable habit of life insurance, and are a public as well as a private evil."

On our part, we certainly cannot see how bankers or solicitors would be injured should the Bill become law. If their practices are perfectly innocent and straightforward, they can have no objection to informing their clients as to their custom; and, since the essence of any offence under the Bill is its secrecy, they would thereby remove their customs from out the category of indictable offences. On the other hand, if they think their business would be injured by an open announcement of the commissions they receive, then *ipso facto* those commissions are acknowledged to be dishonest, and should be illegal. If "everybody knows," then no hardship can arise from everybody being formally reminded, of those commissions.

Having indicated the nature of the offences intended to be created, Sir Edward proceeds to discuss the punishments proposed to be inflicted for their committal. According to the gravity of the offence, it would be punished either by the delinquent being compelled to pay to his principal the amount unlawfully received, or by fine, or, in the most serious cases, by imprisonment. As against the suggestion that fines by themselves would be adequate deterrents, it is declared that the notorious violations of the Maine liquor law in America, and the recent case of the Paris "Figaro" subjecting itself daily to a fine rather than discontinue publishing State documents relating to "*L'affaire*," are sufficient proofs that fines will not prevent fraud, if the possible gain be great enough. There is an old saying that a judge should never give reasons for his

decisions; and in this case we think that while Sir Edward Fry's conclusion is correct, his illustrations are unconvincing. In both the cases he cites, the gain greatly outbalanced the fine; and the offence was eventually profitable. They do not, therefore, prove that the fear of fines, together with forfeiture of the amount unlawfully received, would not be sufficient to deter an agent from receiving illicit commissions. The reason why we think imprisonment should be one of the alternative punishments is that many a man would risk the forfeiture of ill-gotten commissions, even with an added fine to pay, who would be very chary of incurring the risk of being branded as a gaol-bird.

Sir Edward next deals with the main objections urged against the measure for which he is standing godfather. The first is that it would include acts so trivial as to be almost innocent, and which it would be unreasonable to sentence anyone for committing. This view of the Bill would not, he thinks, be taken by anyone with a nice sense of honour, and for two reasons. First, because the Bill purposely excludes from its operation gratuities such as it is customary to give to domestic or railway servants (many people would be glad to see even them made illegal!), and the giving of meat, drink, or accommodation, by way of *bonâ fide* hospitality only. Second, because leave of a Judge of the High Court is made a condition precedent to any prosecution under the Bill; and, further, the Magistrate or Court may in certain cases, on conviction of the accused, suspend the passing of judgment, as is already frequently done in the case of first offenders. Sir Edward would himself prefer to rely solely upon this latter provision—believing that there will be too few, rather than too many, actions taken under the Act, if it be passed.

The second objection, or rather difficulty, that has been pointed out is that of obtaining evidence calculated to convict. Here we think Sir Edward fails entirely to shake one's conviction that this will prove one of the greatest hindrances to the effectiveness of the proposed legislation. "At the present time," he says, "it is by no means uncommon to offer bribes in writing or by circular, and, even when that it is not the case, sometimes there will be available the evidence of a messenger or bystander." But is it imagined that what is done "at the present time," when no criminal liability attaches, would be done if the Bill became law? Surely Sir Edward Fry knows the "deft scoundrels" of the world better than to so insult their intelligence. He further urges that the same difficulty applies to the operation of Lord Randolph Churchill's Act of 1889, which relates to the corruption of public officers, and which, he says, has not been found inoperative, but rather is "believed, by some who are capable of expressing weighty opinion on the point, to have wrought much good." The case of an officer of a public corporation, who is obliged to work in co-operation with numerous other officials, does not appear to us to be parallel with that of the commercial traveller or agent of a private trading firm, who works quite independently of others. The first, we imagine, would run much greater risk of discovery than the second. "Sometimes the course of business will furnish cogent confirmation," it is said. But it would have to be very cogent, surely, to induce a Court to convict, supposing the Bill became law.

It will, we feel convinced, be an extremely difficult matter to obtain conclusive evidence of secret commissions, should those transactions be declared illegal; and Sir Edward Fry's further reference to the Corrupt Practices Act (dealing with electoral corruption) from which provisions—as to indemnifying witnesses from proceedings being taken as a result of their giving self-incriminating evidence—are borrowed for insertion in the Bill under notice, only strengthens this conviction. The difficulty of obtaining satisfactory evidence of actual corruption in the case of elections notoriously obtained by corrupt means, has rendered the Act referred to practically a dead letter. Its only force lies in its preventive influence. In like manner we think, as probably the authors of the Bill for preventing commercial corruption really think, that the measure will chiefly act as a deterrent, and not, to any material extent, as a punisher, of ill-deeds. It would, as the reviewer says, "be a solemn utterance of the national conscience against an evil practice; and though it be true that you cannot make men good by Act of Parliament, it is true also that the laws of a country do much to quicken and enlighten the conscience."

Finally, Sir Edward suggests that beyond, or in anticipation of legislation, much may be done towards encouraging honest methods, by agreements between traders not to give secret commissions; by stipulating in hiring agreements, and preferably in writing, that the servant or agent shall not only not accept, but shall also report to the principal the offer of, any such commission; by closer supervision over agents; and by the payment of adequate salaries to those placed in positions of trust. The latter, as we have often before now pointed out, is by no means the least important. It is also suggested that a Society, formed with the object of forwarding the extinction of commercial corruption, might achieve much good; but no indication is given of the lines upon which it might work. The Societies for the Prevention of Cruelty to Animals and Children are instanced as examples; but secret commissions are not given, like blows upon an over-worked beast or an under-fed child, in the sight and observation of man. We fancy the post of Inspector to a Society for the Abolition of Secret Commissions would be a complete sinecure. Does not the Early Closing Association afford a better precedent?

With all this scepticism, however, as to the possible results of experiments in legislation or concerted action, we have great sympathy with the end sought to be attained. Lord Russell and Sir Edward Fry are to be honoured for their efforts; and we shall watch the outcome with interest, and sincerely trust that a perceptible abatement of the evil of commercial corruption will speedily ensue.

PERSONAL.

Mr. HARRY MARSDEN, of Brighouse, has been appointed Manager of the Whitchurch (Hants) Gas-Works.

The Directors of the Gomersal Water Company have given proof of their appreciation of the services of their Secretary and Manager, Mr. JOHN SHAW, by presenting him with a handsome smoker's cabinet. He has occupied the position for 27 years.

The Council of the Society of Arts have awarded medals to Mr. DIXON H. DAVIES, for his paper on "The Cost of Municipal Enterprise," and to Mr. J. SWINBURNE, for his communication on "Nernst's Electric Lamp," read in the past session, and noticed in our columns at the time.

Mr. E. ONIONS has been appointed Manager of the Loughborough Gas-Works, in succession to the late Mr. J. Bramley Ball; and, as will be seen by an announcement which appears elsewhere, the Company are inviting applications for the position of Clerk and Collector vacated by Mr. Onions.

Alderman RADCLIFFE, who has devoted himself so thoroughly to the work of the Liverpool Corporation Water Department, has thought fit, owing to advancing years, to retire from the chairmanship of the Committee, much to the regret of his colleagues. On his own proposition, Alderman BURGESS, who has been Deputy-Chairman for the past four years, is to succeed him; and Mr. J. T. WOOD is to take up the duties of the deputy-chairmanship.

At a social gathering of about 200 of the officials and employees of the Bolton Corporation Gas Department, held on the evening of the 11th inst., Mr. W. J. SMITH, the Assistant-Manager, was presented with a handsome clock, bearing a suitable inscription, as a mark of their respect and esteem, on the occasion of his recent marriage. In making the presentation, Mr. H. Eccles stated that nearly every branch of the department had participated in the testimonial. Mr. Smith acknowledged the gift in suitable terms.

OBITUARY.

WILLIAM HARDIE.

We regret to record the death of Mr. WILLIAM HARDIE, formerly Secretary of the Newcastle-on-Tyne and Gateshead Gas Company, and Honorary Secretary and Treasurer of the North of England Association of Gas Managers. Deceased had been ailing for some months; and he passed away last Tuesday at his residence in Tynemouth. Mr. Hardie was born in Edinburgh on the 13th of March, 1830; his father being the Superintendent of the Register House. On leaving school, he entered the office of a stockbroker in the city, and subsequently removed to Newcastle to take up similar duties. While there he made himself proficient in shorthand. After a sojourn of three years on the banks of the Tyne, he returned to Edinburgh to take an appointment which his father had procured for him in the Register House. But he grew tired of the dreary routine work of the office, and determined to put his stenographic knowledge to practical use. He obtained a position as reporter on the "Sunderland Times," and acquired such proficiency as a journalist that he not only contributed to the editorial columns, but for a time was responsible for many of the managerial details. Journalism, however, was not to be his life-work; for in 1855 he obtained the post of Secretary of the Newcastle and Gateshead Gas Company. While discharging the duties of this office, he made himself acquainted with the technical side of the gas business, and gradually arrived at the position of General Manager. He received a gratifying recognition of the tact and judgment he displayed in this capacity in the presentation, to him, in December, 1874, of a silver salver and tea service of the same material by the employees at Elswick and Redheugh, "in appreciation of his kind and courteous conduct towards them." Equally he secured the confidence and respect of the Directors of the Company. At the annual meeting of the Company in 1881, the then Chairman (Alderman Hedley) characterized him as "one of the best secretaries, and as one who had thrown his whole heart and soul into the work;" and he received a gift of fifty guineas. When the British Association of Gas Managers visited Newcastle in 1879, Mr. Hardie rendered valuable service in organizing the inspection by the members of the works under his supervision; and he was always ready to welcome his colleagues in Newcastle. Early in 1897, he found it necessary, owing to impaired health, to relinquish his duties; and, in consideration of his long services, the Directors granted him a retiring allowance. Mr. Hardie joined the British Association of Gas Managers in 1872; but he never contributed to their proceedings—the benefit of his technical knowledge being reserved for the North of England Association, of which he was one of the founders. He was President

in 1885-6, and during his term of office contributed a short paper on "Regenerative Furnaces as Applied to the Gas-Works of Ghent," of which a description had previously been given in the "JOURNAL." Subsequently, in 1891, he raised, in another paper, the question of the advisability of owners of gas-works becoming tar and liquor distillers. He retired from the secretaryship in 1897; and at the spring meeting he was presented by the members with a handsome testimonial, consisting of a silver coffee service and other gifts, in recognition of the valuable services he had rendered to the Association for a period of twenty years. Mr. Hardie leaves several sons and daughters. One of the former, as our readers are aware, is the Engineer and Manager of the Tynemouth Gas Company; and another (Mr. T. Hardie) is Manager of the Redheugh works of the Newcastle Company, whose present Engineer-in-Chief—Mr. W. Doig Gibb—married one of Mr. Hardie's daughters.

The death is announced of Mr. A. PARKIN, Secretary, and one of the founders, of the Epworth Gas Company.

It is our sorrowful duty to have to record the death of the bearer of an honoured name in the gas industry. We refer to the venerable Mr. GEORGE GLOVER, who was senior partner in the firm of George Glover and Co., Meter Manufacturers, of Chelsea. Mr. Glover, who passed away on the 15th inst., was in his 96th year.

The death occurred, on the 9th inst., of Mr. JOHN BRAMLEY BALL, for many years Manager of the Loughborough Gas-Works. Mr. Ball had been in poor health for some time; but his death was quite unexpected. Deceased, who was 53 years of age, was articled to Mr. A. C. Fraser, the former Manager at Loughborough. After being with him for some time, Mr. Ball obtained the appointment of Manager at Yeovil; but on the chief post in the Loughborough undertaking becoming vacant, he was successful in securing the position, and returned to his native town. For about 28 years he ably conducted the concern, which is passing into the hands of the Corporation. Mr. Ball leaves a widow, one daughter, and two sons. The funeral took place on Monday of last week at Loughborough Cemetery.

Manchester District Institution of Gas Engineers.—The 120th quarterly meeting of the Institution will be held at the Midland Hotel, Bradford, next Saturday, under the presidency of Mr. R. G. Shadbolt. We learn from the circular issued by the Hon. Secretary (Mr. S. S. Mellor, of Northwich) that the general business will comprise the election of one new member and of the President for the ensuing year. The technical portion of the programme consists of a paper by Mr. Thomas Newbigging, on "Some Disputed Points in Gas and Water Works Legislation," and discussions on "Laying Gas and Water Mains in Public and Private Streets" and "Profit-Sharing, or Payment by Results," introduced respectively by Mr. Arthur Graham, of Mansfield, and Mr. G. W. Lupton, of Otley.

Gas at the Paris Exhibition.—Many of our readers will no doubt remember that, on the occasion of the Universal Exhibition held in Paris in 1889, arrangements were made for a collective exhibit of gas appliances in a building specially erected for the purpose in the grounds. A Committee of the Société Technique du Gaz en France has been formed, with M. Lebon as President, to organize a similar display in connection with the Exhibition of 1900, with the special object of showing the progress made in the past decade. The necessary site in the Champs de Mars has been allotted by the Commissary-General of the Exhibition (M. Picard), who has approved of the plans prepared by M. Georges Roussi for the Gas Pavilion, the construction of which is making rapid progress. Foreign exhibitors will be admitted into the pavilion, but apart from the French collection. No rent will have to be paid for space occupied; and the gas consumed by exhibits shown in operation will be supplied free. The offices of the Committee are at No. 26, Rue de Londres, Paris.

The Board of Trade and Weights and Measures.—The annual report by the Board of Trade on their proceedings under the Weights and Measures Acts has just been issued. It is dated the 4th of August, and embraces their work since the 8th of August last year. In that period gas-measuring instruments were verified at the Standards Department for the use of 39 gas companies, local authorities, and other bodies; the models of gasholders deposited with the Lord Mayor of London, under section 3 of the Sale of Gas Act, 1859, being verified last December. In pursuance of that section, and of section 33 of the Weights and Measures Act, 1878, the Department are now issuing to local authorities stamps of a uniform design for the year 1900, to be used for the inspection and stamping of gas-meters throughout the United Kingdom, with such variation of number thereon as shall be sufficient to distinguish the district of each inspector of meters. The Board of Trade are in communication with some Government departments with the view of ascertaining how far the metric system of weights and measures might be officially adopted in contracts; and the Standards Department have in course of preparation, for the purpose of explaining the principles of the system in schools, a set of educational models of metric weights, measures, and weighing and measuring instruments similar to those used in trade.

NOTES.

A Meter System for Street Arc Lamps.

The Committee of the American Society of Municipal Improvements, which has had under consideration the subject of street electric lighting, has reported in favour of a meter system of charging for this service. Usually, in America as in the United Kingdom, certain types of lamp, commercially recognized as being capable of giving 1200 or 2000 candle power, using respectively 330 and 480 watts of current, are specified in street lighting contracts. The lamps are contracted for to run a stated time, and are paid for at so much each per annum. There is no guarantee under this form of contract that the lamps shall actually be supplied with the amount of current stated, or that they shall give anything like the quantity of light for which they are rated. Also, the question of allowance for extinctions is a difficult one to arrange satisfactorily on a time schedule. All failures of inspection are to the loss of the town. Consequently, a meter system is advocated. It is calculated that the public lighting ought to be done for about 2½d. per Board of Trade unit. It is not stated, however, whether the public arc lights of any town have yet been satisfactorily metered. Until this can be proved, the question of practicality will remain in doubt.

To Clean Boilers from Scale.

It is stated in the "Bulletin" of the French Society for the Encouragement of National Industry, that boiler scale is rendered quite loose, so as to be for the most part washed away on running off the water, by the simple expedient of allowing the boiler to cool off very slowly after being laid out of service. If any scale remains attached to the shell after this, it can be washed off by a strong jet of water. The necessary degree of slowness in cooling off the boiler is exceptional, and can only be attained by letting the operation occupy from eight to ten days. This is admittedly a considerable time; and therefore the particular cleansing process in question will probably never come into general use. It so happens, however, that under some conditions—as where steam-boilers are only required for seasonal use—this objection to the length of time for cooling off would not apply; and in these circumstances the plan might be worth a trial. It is added, in relation to the subject, that this method will be found specially convenient for boilers with small tubes or parts difficult of access. Hand labour in cleaning might therefore be saved by cooling off boilers of this description very gradually. It probably means keeping up a slow fire, as of breeze, for a week or ten days in the disused boiler-furnace; but why this should have the effect of loosening the scale is not very apparent.

A New Tar Paving.

The search for new paving materials is one of the labours of an advancing civilization. The resources of the earth in respect of suitable paving-stones have for some time been supplemented by artifice; and it is now reported that a new German make of artificial paving-stone is meeting with a large demand. In this process, the ingredients are coal tar mixed with sulphur and thoroughly warmed until the mass is semi-liquid. To this mixture chlorate of lime is added. After cooling, the mass is broken into small pieces and mixed with powdered glass, or blast-furnace slag. This powder is then subjected to a pressure of 200 atmospheres, and so pressed into the shapes and sizes required. Its resistance to wear and tear is stated to be fully half as great as that of Swedish granite. It is therefore equal in durability to many natural road metals, especially as regards resistance to temperature changes. It finishes with a rough surface, giving a good foothold for horses, and does not readily transmit sound. Finally, repairs are easily effected. The foregoing particulars are taken from the "Journal of the Society of Arts," which does not give its authority for the information. The description of the mode of manufacture of the paving material is very vague; but the possibility of making on a basis of coal tar a paving material which is not an artificial asphalt, is of sufficient interest to warrant reproduction of the information as it stands.

A New Radio-Active Substance.

Progress has been made in the search for radio-active substances. M. Debierne, in a communication to the "Comptes Rendus," describes his own success in following up the known indications of pitchblende, which point to the conclusion that this mineral contains two new radiant elements—polonium and radium—both more active than uranium. Polonium is an element closely akin to bismuth, which it accompanies in all chemical reactions. It is only by repeated fractionations that the separation can be effected. M. Debierne has turned his attention chiefly to that portion of the acid solution of pitchblende which is not precipitated by sulphuretted hydrogen, and is precipitated completely by ammonia or ammonia sulphide. The material with which he started was almost free from uranium, and appeared to contain a very slight quantity of radiant products. Hundreds of kilogrammes of material had to be worked over; and eventually the residuum of rare earths appeared. As the separation became perfect, the radio-activity of the substances increased, until the operator came to a small portion containing titanium and analogous bodies, which showed radio-activity in

the most marked degree. After an extremely complicated process, M. Debierne arrived at a substance which emitted extremely active rays. Its activity in this respect is 5000 times that of uranium. Further, the substance has chemical properties entirely different from those of radium and polonium. It is distinguished from radium by not being spontaneously luminous; the latter emitting a distinct light when placed in a dark room. All these researches are intended to find something which will yield light with less than the usual amount of excitation; and M. Debierne evidently thinks he is on the right track.

The Arch Principle in Dams.

The above subject is dealt with in an article by Mr. Robert S. Ball, jun., in a recent number of "Cassier's Magazine." He says the application of the arch principle to dams is of comparatively recent date, for though some old structures have curved outlines, convex on the up-stream side, they were so made for the sake of appearance, and cannot rightfully be called arch dams. The arch dam proper is virtually a masonry arch with which the pressure of the water, impounded on the convex side, takes the place of the load; but the weight of the masonry does not add to the load, as in the case of the railway arch. Like the railway arch, however, the load on the arch dam is resolved into a lateral thrust transmitted to the abutments on the banks of the river. It is, however, difficult to determine with any degree of accuracy the magnitude of the reaction at the abutments, as the weight of the masonry and the adherence of the structure to the foundations introduce disturbing influences, and a large part of the water-thrust is absorbed in overcoming them. Considerations of cost limit the use of the arch dam to small spans. A narrow river bed bounded by steep, rocky embankments is especially adapted for this type; and engineers have not been slow to take advantage of such natural inducements in some parts of the world. In the mountainous regions of California, where many rivers utilized for purposes of water power and water supply rush down narrow gorges bounded by precipitous cliffs, the conditions are most favourable for the arch dam; and many of the boldest structures of this kind may be seen in that beautiful country. Perhaps the most famous is the Sweetwater dam, 90 feet in height and 340 feet long—a narrow wall, bending up-stream in a graceful curve, the slender outlines of which cause feelings of distrust in the non-technical observer as to its competency to perform the steady and unremitting duty of holding back the waters of the river; for it has been well and truly said that "an arch never sleeps"—an aphorism which might be applied to arch dams where the water never fails.

Steam-Engine Performance.

Professor R. C. Carpenter, of Cornell University, recently read a paper on the results of steam-engine tests carried on under his supervision during the past eight years by advanced University students. The object of the tests seems to have partly been to ascertain what the engines selected for testing were actually doing under the conditions of service, with varying loads. It is, of course, well known that the efficiency of steam-motors with full loads is something very different from that obtained with diminished loads. All the engines tested were employed at electric power stations, and may thus be classified as similarly occupied. The simple non-condensing slide-valve engines were found to have an average steam consumption of 34·3 lbs., and of fuel 4·63 lbs. per indicated horse power per hour. This is not at all bad; the steam and fuel consumptions for the same class of engines under the most favourable conditions being only 25 per cent. better. It also means that the motors were worked at about two-thirds of their rated power. The non-condensing Corliss engines, worked at about half power, consumed 28·3 lbs. of steam per indicated horse power, and of fuel 3·45 lbs. The compound non-condensing engine does not appear to be an economical kind of motor. The average results of the tests of the compound condensing slide-valve type, made at power stations using automatic engines, show a steam consumption of 24 lbs. and a coal consumption of 3·41 lbs. per indicated horse power per hour. Most of the makers of this class of engine will guarantee them to work at a consumption of 18 lbs. of steam per indicated horse power per hour, under favourable conditions of loading. The effect of variable load, and other conditions of actual power-house working, is to affect the economy adversely by 30 to 40 per cent. as compared with the best results with a steady load. The average evaporation, from and at 212° Fahr., per pound of combustible, was found to be as follows: For stations using the simple non-condensing engine, 10·26 lbs. of steam; for stations using the compound condensing slide-valve engines, 9·82 lbs.; for stations using Corliss compound condensing engines, 10·54 lbs. The results are very uniform; the variations being withing 7 per cent. It is confessed that the reason for the evaporative duty being better for the stations using simple engines than for those with the most expensive engines is not apparent. The broad result is that the total structural cost per horse power does not differ greatly for the various classes of engines. In working expenses, however, the simple or old-fashioned engine is hopelessly out of the running. The general conclusion is that, for 500-horse power units and upwards, the compound condensing engine of the best type and with improved valve-gear is the most economical.

TECHNICAL RECORD.

AMERICAN GASLIGHT ASSOCIATION.

Annual Meetiag at New York.

The Twenty-seventh Annual Meeting of this Association was held at New York on the 18th and 19th ult., under the guidance of the President, Mr. A. C. Humphreys. A substantial addition to the list of members was made by the acceptance of 52 applications for active, and 16 for associate, membership. In the report of the Council, reference was made to a proposal received from the Société Technique de l'Industrie du Gaz en France, to the effect that the Association should take part in an International Congress of Gas Associations to be held at the Exposition at Paris next September; and the subject was recommended as worthy of support. The trustees appointed at the last meeting to administer the Gas Educational Fund presented a very satisfactory report. Subscriptions, amounting in the aggregate to over £1000 per annum, had been guaranteed for five years, and £1600 had been actually paid. The sum of £700 had been spent in salary, rent of offices, furniture, stationery, &c; and the balance was invested. The number of students, which included all classes of employees on gas-works, was 100 on Jan. 1; and it was steadily increasing. The students were divided into three sections; and a set of questions was issued to each section every three months; the answers being sent in within two months after receipt of questions. Samples of the questions and answers, and of the letters criticizing the replies, that are sent to each student, were exhibited. In addition to the educational work, copies of all the gas papers printed in English are filed at the office, together with subject-indices of the principal articles, law cases, &c., and are available for the use of students or subscribers. The number of subscribers is at present 92; and the amount contributed ranges from 4s. to £200 per annum. The report of the Research Committee invited research on the measurement of high temperatures, the removal of tar from water gas, the point at which coal and water gas should be mixed to get the best results, the production and separation of cyanides, and the effect of regenerator firing and anti-dips on the yield of ammonia.

The President's Inaugural Address has already been reproduced in these columns—*ante*, p. 1059.

Mr. A. H. Strecker, of Newark, N.J., read some "Notes on Prepayment Gas-Meters." He introduced these appliances in July 1, 1897. The regulations stipulated that they should be fixed in safe places, and should only be furnished to reliable people. In the case of tenements or flats, each floor being let to separate tenants, some difficulty arose as to the protection of the meter, which must necessarily be in the basement and near the front wall. The cellars were common to all the tenants; and frequently not locked up at all. The regular price of gas was 5s.; and the prepayment meters were set to deliver 200 cubic feet for each quarter-dollar deposited. This was equivalent to 5s. 2½d. per 1000 cubic feet; the 2½d. being looked upon as a contribution towards the additional cost of the meter. Canvassers were employed, who worked on commission, and in 18 months 3500 new meters were placed, being practically entirely fresh and additional business. They laid the service, and supplied a limited quantity of interior fittings free. At first only 3-light meters were fixed; but lately he had introduced 5-light meters as well. From the first there was some trouble from shortage of cash, not only due to faulty shut-off valves, but to dishonest tampering. The deficiency for 1898 was 2 per cent.; but later makes of meters had been much improved. At first there was not much actual robbery; but during last spring there was a regular epidemic of this class of burglary, which took some time to put down. The repairs to prepayment meters cost more than those to ordinary meters; and there was much trouble from complaints, frivolous and otherwise, in connection with the system, all of which meant time and money. An alteration in the price of gas was quite a piece of work. Apart from this, the ordinary routine of emptying the coin-boxes, &c., meant an increase of labour. Altogether the prepayment system was only a qualified success. The average consumption per meter was 10,000 cubic feet per annum, or less than that with an ordinary 3-light meter. But in eighteen months he had built up a fairly steady business of 35 million cubic feet per annum. Not only the working costs, but the investment of capital was larger with prepayment than with ordinary meters; and he quoted figures showing that gas sold under the slot-meter method should be charged 7⅛d. per 1000 cubic feet above the usual price, in order to come out even. Some of the prepayment business could possibly be obtained by other and cheaper methods. The slot meter might be a great success in some cases, and a failure in others.

Discussion being invited, Mr. Miller, of Long Island, said that the prepayment meters had not been a success in his district. He questioned whether, if a separate account was kept, it would not be found that this class of business was actually conducted at a loss, and whether much of the business could not be obtained in other ways. Mr. Nettleton disagreed, saying he had 750 prepayment meters in use, and that people greatly appreciated being able to make small frequent payments. The consumption averaged 10,000 cubic feet per annum; and in his experience

the system secured business that could not be obtained in any other way. He put the extra cost at 5d. per 1000 cubic feet. Mr. Butterworth had 500 prepayment meters in use. The average consumption was 8000 cubic feet; and the additional costs 3½d. per 1000 cubic feet. Mr. Reichelt spoke strongly in favour of the system, which he found to be a great improvement on short period collections. Fortnightly collections increased the costs to the extent of 2½d. per 1000 cubic feet for collection, did not entirely do away with bad debts, and increased the office work, making a total extra expense of 6½d. per 1000 cubic feet; while the extra cost of the prepayment system, with an average consumption of 13,000 cubic feet per meter, was less than 4d. Mr. Keppelman preferred the prepayment system as saving collection and a good deal of office work. At present the consumption per meter was small; but he believed it would increase. Mr. Daniels also spoke favourably of his experiences with the system. Mr. Collins, of Seattle, Washington, said that one-third of his meters were of the 5-light prepayment type; and the average consumption was 14,000 cubic feet per annum. He canvassed energetically, and was satisfied to begin with a Welsbach burner and a boiling ring. Some 1300 prepayment meters were now in use, and proved thoroughly satisfactory. He found a reduction not only in office work, but also in the number of complaints. Some of his customers preferred to use lead tokens instead of coins, and to pay the collector in cash when he came round. That was one way of preventing robbery. Mr. Harper and Mr. Norris favoured the prepayment meter as securing business otherwise unattainable, and as encouraging the consumption of gas. Mr. Searle, of Atlanta, Ga., advocated the sale of tokens for use instead of coin in the slot meters, at fixed prices. Several other speakers strongly supported the system.

Mr. Strecker, in the course of his reply, said that he had not sought to pass a judgment on the system, but to relate his own experiences. He agreed that it should not be worked at a loss, but the extra charge should cover all extra expense. There was no way of enforcing the obligations binding on a consumer beyond removing the meter. One way of guarding against robbery was by means of a small auxiliary machine that could be placed in charge of the consumer, and would deliver tokens in exchange for coins; the tokens themselves being only usable for the meter.

A paper on "The Pumping of Gas" was read by Mr. G. J. Roberts, of Philadelphia, Pa., who said that the gas might be pumped direct into the distributing mains, in which case a fan exhauster or else a pump was preferable, because it maintained a steady pressure without fluctuation; or it might be pumped through special high-pressure mains to the outlying gasholder stations, and distributed from the holders in the ordinary way. He made several practical tests with a view of finding out whether there was any loss of illuminating value by pumping under pressures as high as 50 inches head of water, and the efficiency of the exhausters under various conditions of pressure. The results of these tests were fully investigated, and were given in tabular form under 24 headings, showing volume and specific gravity of the gas, revolutions and "slip" of exhauster, diameter and length of main, temperature and pressure at various points, indicated and actual horse power efficiency, per cent. of slip, &c. The results showed that the positive is more effective than the fan exhauster, that the best efficiency is secured at the highest speed, and that there is no loss of illuminating value of the gas. It would appear that in conveying gas to outlying stations, the highest pressure is the most economical. With a Wilbraham exhauster, the power required per 1000 cubic feet per hour per inch head of pressure was about $\frac{1}{200}$-horse power.

Mr. Addicks, in opening the discussion, agreed with the figures quoted by the author, and remarked that the effect of pumping gas under pressure was to raise its temperature 7° or 8°. The greatest efficiency was obtained at a constant and maximum speed. Mr. Crisfield, assuming a particular case, argued that a 12-inch main, worked at higher pressure, would be 40 per cent. cheaper than a 24-inch main. The cost of pumping against 50 inches head of water was about ½d. per 1000 cubic feet of gas. He also thought that the construction of the fan exhauster admitted of considerable improvement. Mr. Doty said, contrary to the author's experience, he found a considerable loss in transmitting 25-candle gas a distance of seven to nine miles under 30 to 50 inches pressure. He could only depend upon an average of 21-22 candles at the far end. Mr. Beal characterized the cost of pumping as inconsiderable; and he enlarged on the economy of high-pressure small mains as compared with large low-pressure mains. The President argued that the quality of the gas was not injured by compression within moderate limits, but that, on the contrary, it was quite possible that it might be slightly improved.

Professor H. Morton, of Hoboken, N.J., delivered a lecture on "Recent Developments in Artificial Illumination." He commenced by references to the electric light scare of 1878, which was brought about by Edison's discovery of the incandescent electric lamp, and to an address which he delivered before the Association at that time. Then, early in 1890, he addressed the Association on the subject of the Welsbach burner. Later on, Dr. Auer von Welsbach discovered and patented the use of thoria with a small proportion of other substances, which raised the candle power from 10 or 20 to 40 or 50 candles, and rendered lighting by gas popular. Meanwhile, electricity had advanced in regard to several details. The lamps might be a little cheaper, more durable, and more efficient than they were 10 years ago; but, on the whole, there was little advance as regards the lamp. There had, however, been great improvements in the distribution of electricity in the alternating system, and the methods of transforming and converting electric energy. There was a possibility of improvement in the electric incandescent lamp by the use of osmium instead of carbon filaments. The Welsbach mantle had been considerably improved in details since it was first introduced. He did not believe that the incandescent oil-lamp would replace gas to any extent, because it was necessary to get the oil-reservoir hot before it would start. A system of using oil in conjunction with air under pressure for incandescent gas-lighting was next described. One way of improving the incandescent gas-light would be by the adoption of a regenerator process, as the increase in the temperature, if only to the extent of a few degress, would make a great difference in the yield of light. The incandescent gaslight also offered great facilities for the introduction of a cheap heating gas, which would also be available as a fuel for general purposes. In conclusion, he enlarged on the importance of looking with conservative coolness on new inventions which promised great things. Whatever the improvement might be, it required time to grow and mature to really useful dimensions.

Mr. F. N. Morton, of Hoboken, N.J, read a paper entitled "Another View of Interior Illumination." He remarked that the subject, especially in regard to what really constituted a good light for the eyes, had been much neglected. Indirect lighting appeared to find most favour with experimenters; and the system first introduced by Mr. King, of Liverpool, of concealing the lights themselves behind a cornice, and trusting to a curved white ceiling to reflect the light through the apartment, had been applied in many ways. At the Paris Electrical Exposition, 1881, direct light was cut off by reflectors below the lights, which directed the light against a whitewashed ceiling. Light deflected or diffused from the ceiling was all that reached the occupied parts of the room; and the effect was not altogether satisfactory. The substitution of ground or opal glass for the opaque reflectors was a great improvement. The light was claimed to be pleasant for reading or writing; and there was an entire absence of shadows. This system had been tried in America, and was described in a paper read by Dr. Myles Standish before the American Academy of Dental Surgeons. Tried in a drawing office, the effect appeared brilliant to a new-comer; but the workers were greatly dissatisfied with the light. The doctor ascribed this to the absence of shadow, to which the draughtsmen had always been accustomed; but the author disagreed, and thought that the unequal lighting, bright at the ceiling and getting less and less toward the ground, was the cause of the dissatisfaction. Another method of lighting the upper portion of a large room having a high domed roof, had been by means of an opaque white sphere, about 7 feet in diameter, upon which the rays from 8 arc lamps were directed by lenses; but this was of little value for practical lighting. The use of a reading lamp by which the light was concentrated on the desk, leaving the apartment in comparative darkness, was condemned by Dr. Standish as bad for the eyes. It really seemed that there was no reliable method of determining definitely what constituted an agreeable healthy light. The author tried some experiments with a member of his family who was afflicted with weak eyes, and who could only read for a few minutes at a time, with a view of ascertaining the best and most useful light. Translucent globes of various colours were tried with the Welsbach burner; but the only tint that proved at all beneficial was a light green. An attempt was made to get a diffused light by directing the rays of the Welsbach burners on to a white ceiling by means of reflectors; but it was found that a very large number of lamps would be required to get sufficient light. Then a central gaselier was fitted, with opaque inverted conical reflectors beneath each burner. This was tried with and without the aid of ordinary reading lamps, but proved of no value. The lighting was not equal; and there was an unpleasant glare when opaque reflectors were used, and this was only modified, and not removed, by using translucent reflectors. After considering the way in which ordinary rooms receive daylight by means of the windows, the author tried to make an artificial window. A screen, covered with light muslin or tissue paper, was set up in a corner of the room, affording a translucent surface of about 10 square feet, and five Welsbach burners with reflectors were placed behind it. The effect was satisfactory, resembling that of a window of the same dimensions. Various tints of translucent material were tried, but none would equal daylight as regards facility for matching delicate tints. The light green shade, however, was found to afford comfort for the eyes. The erection of a vertical screen of sufficient size being inconvenient, a horizontal screen was tried. Five Welsbach lights were arranged in line on a wall, about 6 feet from the floor, and immediately under them was stretched a piece of light sea-green muslin, 9 ft. long by 3 ft. 4 in. wide. The effect was perfectly satisfactory. The question was treated entirely from a hygienic point of view, without considering economy. The most economical light would be a naked one reinforced by reflectors. The method he advocated for adoption was to extend the light-giving area, which inversely reduced the intensity per unit of surface.

(*To be continued.*)

IRON CARBONYL IN WATER GAS.

The following is the substance of a communication recently made by Heeren M. van Breukeleveen and A. ter Horst to our Dutch contemporary "Het Gas," on the subject of iron carbonyl in the water-gas industry.

Carbonic oxide possesses the property of forming compounds with certain metals, of which iron and nickel are the most important. Mond, Quincke, and Berthelot obtained these readily volatile compounds by passing carbonic oxide over iron and nickel which had been obtained by reduction of the oxides in a current of hydrogen. But water gas contains carbonic oxide; and Roscoe and Scudder observed that water gas which had been stored in an iron cylinder at a pressure of 8 atmospheres for lime-light purposes contained iron, and that the iron was not in a state of mechanical suspension, as filtration of the gas through cotton wool failed to remove it. Coal gas likewise contains carbonic oxide, though in smaller amount; and iron was similarly observed in compressed coal gas. For some time past, it has been noticed that iron carbonyl may cause inconvenience in water-gas manufacture. In a Dutch factory, where water gas is produced and used for lighting by incandescence, it has been found that the mantles, after a short time, lose almost the whole of their illuminating power, and that a brown deposit appears on them. The authors were called upon to investigate the cause of this phenomenon; and they found by examination that the brown deposit was oxide of iron. They ascertained also that other technical men versed in water-gas manufacture had repeatedly observed the formation of a volatile compound of iron in the gas. Both Dr. Strache and Herr Dicke have called attention to it; but they hold different views as to the source of the nuisance. Dr. Strache assumes that the volatile compound of iron is produced owing to high temperature in the water-gas plant; while Herr Dicke attributes its formation to the action of carbonic oxide on the interior of the mains. Accordingly, Dr. Strache purifies the gas as it leaves the generator by scrubbing it with sulphuric acid, which takes up the iron of the iron carbonyl; while Herr Dicke coats the interior of the mains with tar. An investigation was undertaken by the authors to ascertain which of these views was the correct one; and the results of the researches are as follows.

In the first place, their attention had been drawn to the fact that at the works in question the gas had no harmful effect on the mantles when it was taken from near the outlet from the gasholder, but that gas drawn from the mains several hundred yards from the gasholder caused the objectionable deposit when burnt. At each place, therefore, 10 litres of gas were filtered by passage through cotton wool, and allowed to flow through a capillary glass tube, which was heated. A brown deposit was produced in the capillary in the case of the gas taken from the mains at some distance from the holder; but no deposit resulted from the gas taken directly from the holder. Next 10 litres of gas from the holder were left for a week in contact with freshly-filed pieces of iron piping, such as is used on gas-works. This gas was then passed through the capillary glass tube; and it yielded a considerable deposit of iron therein. Both coal gas and carburetted water gas from the Rotterdam works were then passed through the capillary, in the manner described; but they produced no deposit, and therefore were free from iron. Both these gases were then left for a week in contact with freshly-filed iron; and at the end of this time they were examined in the same manner. The carburetted water gas was found to contain iron; while no iron was discovered in the coal gas. The difference in these results was probably due to the fact that coal gas contains less carbonic oxide than the carburetted water gas.

It was, however, conceivable that the iron had been attacked by some impurity in the water gas. Water gas of the following composition was prepared synthetically: Carbonic acid 2·8, oxygen 1·2, carbonic oxide 33·1, hydrogen 57·7, and nitrogen 5·2 per cent. This gas was free from iron; but after it had remained for a week in contact with bright iron, it was found to contain the volatile compound of iron. All the experiments described were repeated with somewhat rusted, instead of freshly-filed, bright iron; but no difference was found in the results. It therefore appears that an internal coating of rust on the mains cannot prevent the production of the carbonyl. These researches justify the following conclusions:—

1.—That water gas, when left in contact with iron at low temperatures and under ordinary pressure, takes up some iron.

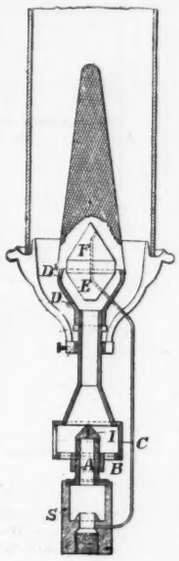
2.—That iron carbonyl is not produced in the actual water-gas plant.

From the experiments on the cause of the trouble, the authors proceeded to try to discover a means of overcoming it. Herr Dicke's proposal to tar the mains internally seemed perfectly reasonable, as it removed the iron from the action of the gas. In the case of new works, it could be readily carried out, and is very appropriate. The authors sought to find a method of removing the iron carbonyl when it was present in gas. They found that passing the gas over moist potassium permanganate had the desired effect. In practice, boxes charged with this material could be interpolated in the mains. In the next place, an attempt was made to take advantage of the fact that iron carbonyl is decomposed at high temperatures. The Kern burner, in which the gas passes through highly-heated fine wire gauze, was used on one occasion without any improvement in the result. The researches were then interrupted by a sudden and great decrease in the deposition of iron on the mantles. This occurred in the month of November; and the authors formed the opinion that the lower temperature in some measure, but the more rapid flow of gas in the mains to a greater extent, was responsible for the decreased production of iron carbonyl. The iron and the gas were in contact for a shorter time in the winter than in the summer months. The authors hope to continue their researches as opportunity offers.

REGISTER OF PATENTS.

Incandescent Gas-Burners.—Jacquinet, L., of Brussels. No. 24,007; Nov. 14, 1898.

The principle underlying the construction of this burner, says the patentee, "is not the combustion of a simple mixture of air and gas under a sieve, as in ordinary bunsen burners, but that of Giffard—the gas carrying air with it in order to produce a more homogeneous mixture, and to have a greater speed of flow, whereby, and owing to the construction of the burner, a long steady flame is obtained, which may be adjusted by adjusting the position of chimney."

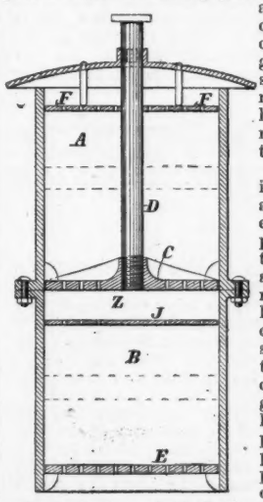


The gas-injector A terminates at the top in a small nozzle I (the action of which is to increase the speed of the gas); while at the bottom is a valve-chamber S. A perforated disc B constitutes the bottom of an air-chamber C, over which rises a cone and tube, to which is connected the crown of the burner. This crown consists of two truncated cones D and D¹ connected at their bases; and at the top is a copper disc, of smaller diameter than the orifice, so as to form a narrow annular discharge opening. The disc carries on its lower face a downwardly projecting cone E, for dividing and directing the mixture into the chamber D; while on its upper face is a cone F, above the annular orifice, for guiding and directing the flame.

When in operation, the supply of gas being regulated by the orifice of the injector-nozzle I in accordance with the pressure and nature of the gas, the quantity of air to be mixed with it is regulated by moving the cone above it nearer to, or farther from, the injector. The mixture entering the connecting-tube is guided into the cup D, under the double cone E, round which it spreads and escapes in a uniform manner through the annular orifice, where it is ignited. In this way, says the patentee, the flame, which is very large, instead of bending, rises in a point along the upper cone F, and renders incandescent the whole mantle surrounding it. It burns very intensely and uniformly, and with great steadiness, which may be increased by adjusting the chimney, which, "when placed at the desired height, produces an absolute steadiness of the flame; the chimney being at the same time, if desired, much lower than the usual non-adjustable chimney."

Deadening the Sound of Exhaust in Gas-Engines.—Melling, H. T., of Liverpool. No. 24,580; Nov. 22, 1898.

This invention relates to gas-engine silencers of the kind that comprise a vessel containing gravel into which the exhaust gases are led, and among which the solid products of combustion are deposited and the vaporous products condensed. Hitherto the gravel has been altogether enclosed by the surrounding vessel, portions of which are made in the form of grids; and when it has been necessary to clean, break up, or renew the gravel, it has been customary to remove the vessel for the purpose.



The improved vessel (shown) is divided into two or more compartments A B, by a horizontal grid C, through which the end of the exhaust-pipe D dips; and a portion of the gravel is supported above the grid. The bottom of the vessel is also formed of a grid E—supporting the remainder of the gravel. A space Z is left between the top of the lower portion of gravel and the grid; and it is into this space that the exhaust discharges. The top of the gravel in the upper and lower compartments is respectively covered by grids F and J—the former cast in two halves, so that it may be removed or replaced without uncoupling the exhaust-pipe. The dotted lines show where other pairs of grids, with space between each of a pair, may (if desired) be placed, in order to further sub-divide the gravel.

When the engine exhausts, the products eject into the space Z; and this cushions and graduates the impact. The gases, &c., being cooled by expansion, and the vapours condensed, the pressure is reduced; and this favours the next exhaust. A portion of the gases rise through the gravel in the upper compartment A; and the remainder descend through the lower layer. The top layer may be broken up or renewed

without stopping the engine or uncoupling any part of the apparatus; while when the gravel is so fouled as to require complete renewal, the bottom chamber B may be unbolted for the purpose.

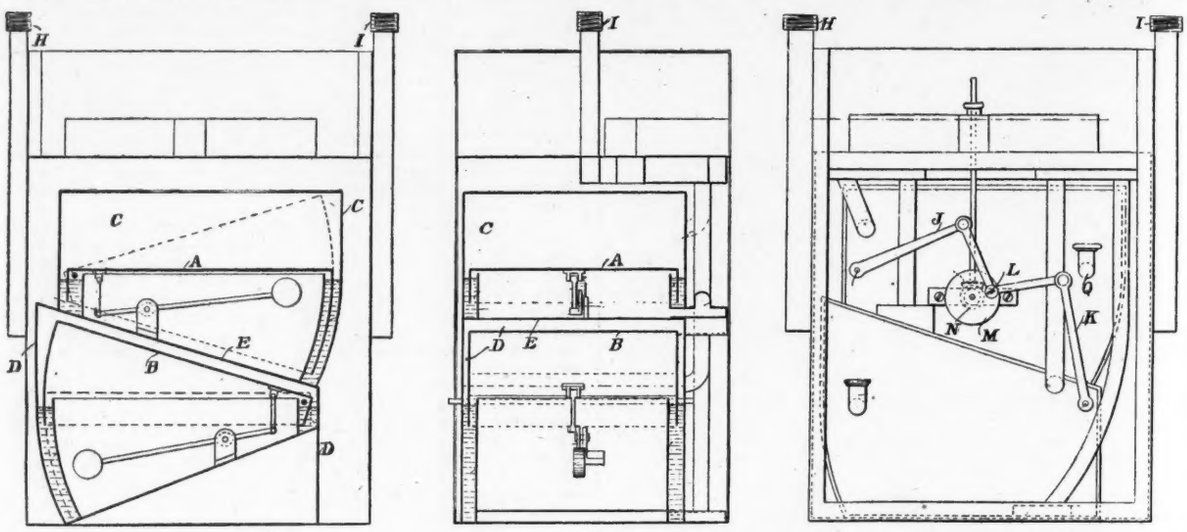
Gas-Meters.—Sutherland, J. C., of Birmingham. No. 22,041; Oct. 19, 1898.

The gas-meter constructed according to this invention has radially moveable diaphragms (forming the measuring device), furnished with projections to pass into a space forming a liquid seal. The chamber thus produced is balanced internally by a weight operating within the casing forming the seal. The chambers communicate with valves actuated from a rotating spindle, operated by the diaphragms when driven by the gas to be measured.

The illustrations show an elevation (partly in section) of one form of the meter, a sectional elevation, and a front elevation with the outside of the case removed, so as to exhibit the method of obtaining rotary motion for operating the distributing valves and recording train.

There are two moving chambers A B, pivoted at opposite sides, and placed above each other in order to take up less space. These moving chambers operate within fixed chambers C D, one above the other, and separated by a partition-plate E. Each moving chamber operates from a horizontal pivot, and moves to-and-fro through any convenient arc, as indicated by the dotted lines. The side edges of the chamber dip into recesses filled with oil to form a seal; and the back edges near the axles dip into a shallower continuation of the oil-seal. Within the channel forming the seal there are balance-weights pivoted upon levers, which at one end communicate by links with the upper parts of the moving chambers; and at the other end they hold the balance-weights. A passage leads from the inner side of the upper chamber A to the port at one end of the valve F; and another passage leads from the outside of the moving chamber to the port at the other end of the same valve. The centre port communicates with the outlet-pipe H of the meter; and the chamber over the valve is connected to the gas inlet-pipe I.

Both chambers are similarly arranged with corresponding passages. Thus the inner side of the lower chamber B is connected to the port at

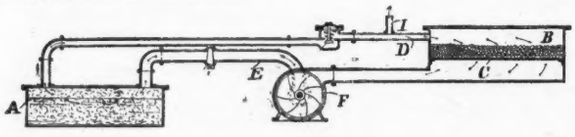


one end of the valve G by a passage; and another passage leads from the outside of the moving chamber B to the port at the other end of the valve. The centre port here similarly communicates with the outlet-pipe H of the meter; and the chamber over the valve is also connected to the gas inlet-pipe I.

The oscillating axles are provided with levers J K, which connect by links to a crank-pin L upon a crank-disc M; the connection being so made that the two chambers operate at right angles to each other on the crank-pin. They thus provide a driving force operating at all times round the circle, as in a dry meter. The crank-disc drives a bevel-wheel, which gears into another bevel-wheel, and operates a vertical shaft, which, being rotated by a crank-pin or eccentric or other connection, actuates the two slide-valves F G connecting the ports, which are arranged as in steam-engine ports. Each slide-valve operates the three ports exactly as in a steam-engine.

Acetylene Generators.—Lanchester, F. W., of Birmingham. No. 24,771; Nov. 23, 1898.

The invention consists in providing the calcium carbide from which the gas is to be generated in a chamber separate from that in which the liquid employed to produce the chemical reaction is contained, and in causing air or gas to pass through or over the liquid (becoming thereby saturated with vapour, and flowing through the substance so that chemical action ensues and the gas is generated and simultaneously dried) by a fan or other means.



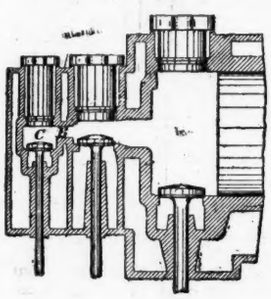
As shown, a water-chamber and a carbide-chamber are arranged at a certain distance apart, connected by suitable pipes. The water-chamber A is only partially filled; the remaining space being occupied by any spongy or porous substance, so that the water may be distributed in it and present a large surface to the dry gas when drawn through it. The carbide-reservoir B is preferably arranged with a perforated tray C carrying the carbide. One pipe D passes from the top of the carbide-reservoir to the top of the water-reservoir; while a second pipe E passes from the top of the water-reservoir to the bottom of the carbide-reservoir, and underneath the containing tray. Arranged in the circuit of the pipe leading to the bottom of the carbide-reservoir is a fan F, rotated in such a way, and whose vanes are so constructed, that a circulation of the gas is kept up in a direction from the water-reservoir along the pipe E through the carbide-reservoir, and along the pipe D, and returning down into the water-reservoir.

When in operation, the revolution of the fan causes any air or gas which may be present to be drawn through the reservoir and become impregnated with water vapour. The gas is then propelled forward underneath the tray containing the carbide into the reservoir, and up through the carbide—the oxygen of the water vapour combining with the calcium; while the hydrogen enters into combination with the carbon, producing acetylene. It is evident that the gas genera'ed is dry; and if the fan is kept circulating, a stream of dry gas is continually passing along the top range of piping D into the water-reservoir, becoming there impregnated with vapour, and then passing along the bottom range of piping E into the carbide reservoir, where chemical reaction and the generation of gas again takes place. The gas is preferably led off at I.

Gas-Engine Exhaust.—Bickerton, H. N., and Bradley, H. W., of Ashton-under-Lyne. No. 25,821; Dec 7, 1898.

This invention relates to the exhausting of the cylinders of large gas-engines, or of engines wherein the products of combustion attain a very high temperature, and wherein the heat generated tends to damage or burn the exhaust-valve and its seating when the valve is opened for the escape of the gases.

To remedy this drawback, the patentees propose to form at a suitable part of the engine cylinder, and in addition to the ordinary exhaust-port, a special outlet or passage B of a restricted character, and provided with an external water-jacket or other means for cooling. This special outlet leads into a chamber C of larger area; the object being to subject the escaping gases, during their passage from the cylinder to the secondary chamber, to a throttling action. This chamber is provided with an auxiliary exhaust-valve, of smaller size than that of the engine proper. When the engine is running, and at the commencement of the first outward stroke of the piston, this secondary chamber contains moderately cool gas from the previous exhaust; and the new charge of gas and air is drawn in, compressed, and fired in the ordinary manner. After expansion, and at or about the time the main exhaust-valve would be opened under ordinary conditions, the auxiliary exhaust-valve is opened, while the main exhaust is, for a short time, kept closed. The release of pressure causes a portion of the hot gases in the cylinder to rush through the special outlet, and into the secondary chamber; but in doing so, the gases part with a portion of their heat (by reason of the sudden expansion), and reach the auxiliary exhaust-valve in a thermal condition which will not so greatly deteriorate the valve or its seating. By the consequent expansion of the gases left in the engine cylinder, these also are brought to a lower temperature, and may be allowed to escape through the main exhaust at the desired moment without any evil results.



Compressing Gases.—Sugg, W. T., of Regency Street, Westminster. No. 26,697; Dec. 17, 1898.

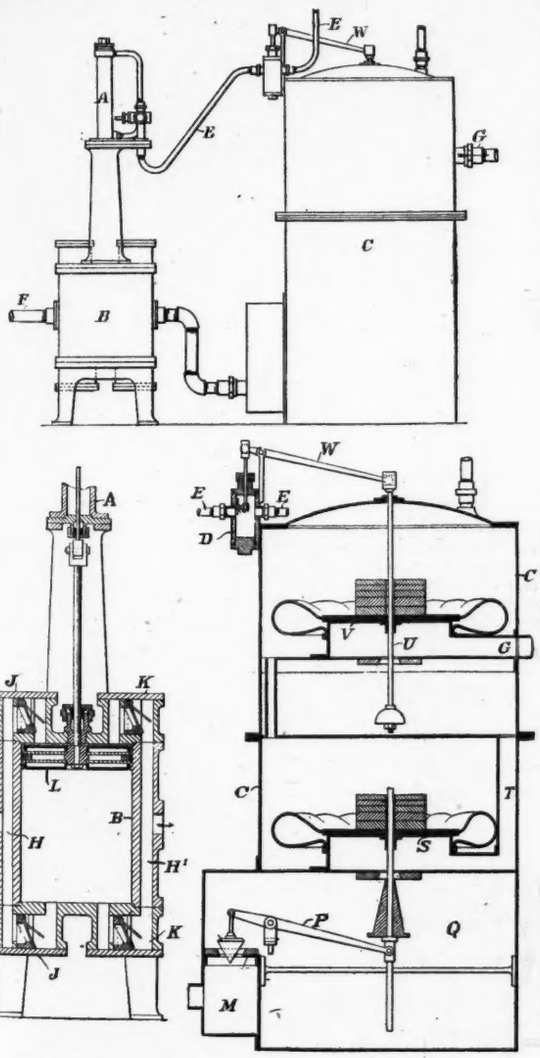
This invention relates to apparatus in which gas is compressed by the aid of water power; the object being "to provide simple and efficient means for compressing the gas, and for regulating the flow of water to the motor, according to requirements."

The illustrations show a general view of the apparatus, a vertical

section of the compressor, and a sectional elevation of the governor mechanism.

A is a direct-acting water-motor, of any suitable construction; B, the compressor; C, the governor mechanism; D, the cut-off for the water; E, the water-pipe for the motor; F, the gas-inlet to the compressor; and G, the gas-outlet from the governor.

The compressor consists of a cylinder, in the walls of which are passages H H^1; the former connected with the inlet F, and the other with the outlet to the governor. At opposite ends of the passage H are boxes J, connected with the cylinder, and containing suitable inlet-valves; and at opposite ends of another passage are outlet-valve boxes K, also connected with the cylinder. The inlet-valves are arranged to open as the compressor piston recedes, and close as the piston approaches; while the outlet-valves are arranged to operate in the reverse manner. L is the compressor piston, the rod of which is connected directly to the piston-rod of the motor A. The piston, which operates in both directions, is loose fitting; leather washers making it sufficiently tight to prevent the gas passing.



The gas travels direct to the installation from the compressor; but inasmuch as, under certain circumstances, the pulsations of the compressing mechanism may be felt, and also the pressure may increase too much, it is at times found desirable to provide governor mechanism which will ensure a steady flow of gas, and which will also, in case of need, operate a cut-off device by which the supply of water to the motor will be more or less (or altogether) stopped, according to the requirements for the time being. The gas, then, as it passes from the outlet-passage of the compressor, will enter the governor mechanism C.

This mechanism consists of a chamber M, with a partition above, an opening in which is provided with a valve-seat for a conical valve carried at one end of a lever P. The chamber is connected with another chamber Q, in the top of which is an opening closed by a conical plug-valve, the rod of which is connected with the other end of the lever P. Above the opening is a flexible diaphragm, or, it may be, a floating disc-governor S, the diaphragm of which is connected to the rod on the lever P, and is loaded to any extent required. The governor S is connected by the passage with another chamber, in the top of which is an opening provided with a seat for another plug-valve, the rod U of which is connected to another diaphragm governor V, also adapted to be loaded. The rod U passes out through the top of the casing C, and is connected with a cut-off. From the governor is a passage connected with the outlet G to the installation. The rod U is connected to one arm of a lever W; the other arm being connected with a slide-valve in the chamber D, or with other mechanism adapted to cut off the supply of water to the motor.

The operation of the governor is as follows: Suppose the installation shut off at G, and the water flowing to the motor, the motor will work to compress the gas in B, and drive it into C. As the gas cannot get away, the pressure will be so increased in C that the governors V and S will be caused to rise—in one case operating the cut-off D, and in the other closing the inlet-valve to the governor mechanism C, "so that the use of water will be prevented, and the risk of accidents due to high pressure will be obviated." Thus, any increase of pressure due to turning out lights will act on the governors to close the water supply to the motor; and any decrease in the pressure will, in like manner, open the water-valve. The working of the motor will thus be dependent on the number of lights going at any given time.

Valves for Water-Gas Apparatus.—Economical Gas Apparatus Construction Company, Limited, and Payne, A. I., of Abingdon Street, Westminster. No. 26,238; Dec. 12, 1898.

This invention relates more particularly to the stack-valves of fixing chambers and superheaters in carburetted water-gas plant—designed more especially for use with fixing chambers and superheaters of the kind described in patent No. 11,657 of 1894; the main object being "to construct the valves and their seats in such a manner as to prevent the escape of gas from such valves when shut, and thus obviate a source of great inconvenience and loss."

According to one way of effecting this object, the cooling water is caused to circulate around the seats of the valves, and, by thus preventing the expansion of the valve-seat, to obviate any escape of gas. The water flows through passages formed in the valve-seat by coring out the casting, or tubing may be cast in or with it for the purpose. The water, after flowing round the valve-seat, can be discharged in any suitable manner.

According to another way of effecting the same object, the stack-valve is provided on its under face with a projecting lip which, when the valve is closed, may dip into mercury contained in a groove or recess formed in or around the valve-seat, and so act as a seal. A channel formed outside or around the groove or recess on the same level as, or a higher level than, the latter, serves to catch any overflow of the mercury that may be forced out by any increase in the internal pressure. From this outer channel, the sealing liquid can be recovered and replaced into the seal.

To prevent the mercury from boiling and giving off vapours prejudicial to health, and also to reduce as much as possible loss due to evaporation, a circulation of cooling water is provided in the seat of the valve (preferably immediately under the seal groove or channel), with the object of cooling the valve-seat and consequently also the sealing liquid. The cooling water, after circulating around, or partially around, the valve-seat, may be led away in any suitable manner.

APPLICATIONS FOR LETTERS PATENT.

21,599.—Stevenson, W. H., "Incandescent gas-cone, for use with incandescent gas-burners and mantles." Oct. 30.

21,642.—Heinle, C., "Gas or oil engines." Oct. 30.

21,676.—Abel, C. D., "Gas-meter drums." A communication from Société Anonyme Continentale pour la Fabrication des Compteurs à Gaz et autres Appareil. Oct. 30.

21,683.—Boult, A. J., "Cleaning pipes and conduits." A communication from F. Novotny and O. Mierisch. Oct. 30.

21,734.—Crossley, W. J., and Atkinson, J., "Internal combustion motors." Oct. 31.

21,745.—Wheeler, J. R., & G. F., "Valve for hot gases." Oct. 31.

21,772.—Rabe, H., "Measuring the rate of flow of gases through tubes." Oct. 31.

21,804.—Lancaster, J. H., "Acetylene gas-lamp." Oct. 31.

21,926.—Hislop, G. R., "Revivification of spent limes." Nov. 2.

21,934.—Sutcliffe, H., "Generating and storing acetylene." Nov. 2.

22,006.—Manwaring, R. M., "Gas food-warmer." Nov. 3.

22,027.—Killing, C., "Igniting media for automatic gas-lighters." Nov. 3.

22,069.—Maxson, W. P., and Reed, H. L., "Acetylene gas-generators." Nov. 4.

22,077.—Bott, J. E., and Robinson, G. A., "Gas-lamps." Nov. 4.

22,098.—Denayrouze, L., "Incandescent lamp." Nov. 4.

22,110.—Clémence, J. A., "Acetylene generators." A communication from A. Husson. Nov. 4.

22.111.—Edwards, E., "Generating acetylene gas." A communication from M. Stindl. Nov. 4.

22,119.—Wilks, G., "Gas and heat engines." Nov. 6.

22,161.—Carter, W. T., and Couvelas, H. A., "Manufacture of calcic carbide." Nov. 6.

22,162.—Lancaster, E. W., "Acetylene generators." Nov. 6.

22,215.—Williams, J., "Gas-engines." Nov. 7.

22,258.—Riegelmann, E., "Valves for gas-compressors." Nov. 7.

22,334.—Demoulin, G. M., "Gas and like engines." Nov. 8.

22,359.—Sheftel, M., "Gas-burners for incandescent light." Nov. 9.

22,362.—Green, W. O., "Prepayment gas-meters." Nov. 9.

22,373.—Guest, J. J., "Pressure-gauge." Nov. 9.

22,421.—Lhotel, L., and Plancher, F., "Gas-engines." Nov. 9.

22,425.—Atkins, G. J., "Manufacture of acetylene." Nov. 9.

22,487.—M'Hardy, J., and Snelgrove, R. A., "Acetylene lamps." Nov. 10.

22,516.—Stern, A., "Acetylene gas-generators." Nov. 11.

22,524.—Collis, J. W., "Gas-burners." Nov. 11.

22,527.—Thompson, W. P., "Carburetting air, or producing air-gas." A communication from the firm of Gebrüder Buxbaum. Nov. 11.

22,541.—Dederich, W., "Acetylene lamps." A communication from O. Scharlach. Nov. 11.

22,569.—Spong, J. O., "Lighting and shutting off gas-flames." Nov. 11.

The Directors of the Continental Union Gas Company, Limited, have decided to recommend, at the general meeting, to be held on the 12th prox., dividends of 5 per cent. for the half year on the ordinary stock, free of income-tax, and of 3½ per cent. for the half year on the preference stock, less income-tax; making 9 and 7 per cent. respectively for the year.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Proposed Monument to the late Mr. G. E. Stevenson.

SIR,—The violent and tragic death of Mr. G. E. Stevenson must have struck with the profoundest concern and evoked the deepest sympathy of the entire profession to which he so worthily belonged. May I suggest that the large numbers of his colleagues who, like myself, were shut out by time and distance from sharing the privilege of those who were able to pay the last tribute of friendship and respect by attending his funeral, might be glad to testify in some tangible shape to the warm personal regard and high estimation in which we all held the distinguished victim of this most regrettable disaster?

At a war time like this, when we daily follow with breathless interest the actions and casualties of our military heroes, we must not fail to notice the devotion and calm courage shown by a civilian, who, in the time of supreme peril (which he would gauge better than the others), placed himself in the forefront, as is so pathetically shown by your account of the inquest, and so encouraged his men to remain and make every possible effort to prevent, or at any rate to mitigate, the awful disaster impending. "Nearest to the danger." Those of us who have been long engaged in the practical operations of conducting or altering gas-works can easily recall, or at least can realize, occasions when, from mischance, circumstances corresponding with those at Manchester would arise, demanding personal efforts and the encouragement of others to take instant and risky measures to control or avert a hastening danger to life and property. We can therefore feel proud to learn that our lost comrade led his men to face the peril.

We are accustomed to see, in many a fane, the deeds and death of brave soldiers perpetrated by mementoes raised by their surviving fellows. Will we not do like honour to the equally courageous, though gentler, life so freely laid down in the "arts of peace"? We might easily raise an appropriate monument to Mr. Stevenson, to be erected in some suitable position, to commemorate both his valuable life and his devoted death.

Before writing to you, I have mentioned this matter to Messrs. Livesey, Woodall, Newbigging, Hunt, and others, who all encouraged the idea. Will you lend us your aid, by acting as joint treasurer, and recording in your columns the names of those who may be willing to support the movement by joining a Committee for the purpose of carrying it through, or, if unable to give their services, by sending a subscription.

HY. E. JONES.

Stepney, Nov. 18, 1899.

[Reference to the above letter will be found in "Editorial Notes" to-day.—ED. J. G. L.]

Trade Unionism and Rates of Wages.

SIR,—In your issue of to-day you say: "It is one of the most cherished superstitions of Trade Unionism that a Trade Union increases and upholds the rate of wages in the employment so organized, and is, indeed, the only means of ensuring this desirable end. Employers of labour—people who pay wages—know that this is not true."

Now you will, I am sure, be the last to deny that, on such a question, the evidence of Mr. George Livesey may be accepted as being based upon experience, and as not being prejudiced in favour of Trade Unionism. Referring to the evidence given before the Select Committee last session on the Metropolitan Gas Question, I find that, in answer to Question 1880—as to why the cost of manufacture by the Gaslight Company should, since 1888, have continued to compare so unfavourably with the South Metropolitan—Mr. Livesey said: "One item is the carbonizing wages. When the Gas Workers' Union started, in 1889, it raised the rate per ton from about 2s. 6d. or 2s. 7d. by quite 1s. The South Metropolitan have got theirs down, by the use of machinery and better working, to 2s. 3d. The Gaslight and Coke Company still remain at 3s. 6d. a ton." That is a direct statement that Trade Unionism, in the largest gas undertaking in the world, has been the means of increasing and upholding the rate of wages in that employment; and, as one expects from Mr. Livesey, it is perfectly true. It is a matter of common knowledge that the Directors of the Gaslight and Coke Company felt themselves unable to stand the racket of a fight with the Union in 1889, and surrendered at discretion—giving the stokers a higher rate of wages for an 8-hour than they had previously been receiving for a 12-hour shift. That they would have made such concessions to their men had those men been unorganized, and without funds, it is not possible to believe.

The argument from the case of the laundry girls, from my point of view, proves nothing. The fact that, because the majority of lower-class girls prefer the greater liberty of factory life—with its evenings free for larriking—and the companionship at work of girls of their own class, to the far more restricted and lonely life of a domestic servant, the supply of factory girls is abundant and their wages low, while domestic servants are scarce and well paid, does not prove that if laundry girls were united in a strong Trade Union they would not receive higher wages than at present. The argument would only have been valid if factory girls were unionists and domestic servants still uncombined.

Is it not a weakening of the strong case that employers have against the abuse of Trade Unionism—its frequent shortsightedness and unreasonableness; its tendency to destroy the goose with the golden eggs, because it cannot have all that are laid; its ignorance of the economic laws of competition and supply and demand, and their effect upon industrial conditions? Does it not militate against the acceptance of arguments against Trade Unionism rampant, to attempt to prove that Trade Unionism has been of no service, and has afforded no protection, to the workers combined under its auspices?

In another article you say: "The employer cannot spare time and money to wait for the conversion of Messrs. Burns, Barnes, and Company. He simply shuts them out." This sounds very magnificent; but is it politics? Is it possible to "shut out" Trade Unionism; and treat it as non-existent? If that is not what is meant by the sentence quoted, what is?

There is, I believe, one way, and one way only, in which the disastrous effects of unreasonable Trade Unionism can be avoided—the only way in which Trade Unionism can be "shut out" from doing harm—and that is by providing an adequate and a better substitute; by constructive, not destructive, reform. Such a substitute has undoubtedly been found by Mr. Livesey. If employers would only spare time and money to formulate, inaugurate, and intelligently work systems of profit-sharing and co-partnership adapted to the various industries in which they are engaged, they would absolutely cut the ground from under the feet of the professional Trade Union agitator. "The employer who pays the wages," it is said, "declines to accept the proposition that industries exist wholly and solely for the benefit of the hand worker;" and rightly. But, on the other hand, is it not too often the case that the employer acts as though he thought that industries existed wholly and solely for the benefit of himself? You are right in holding that a one-sided view of the *raison d'être* of commerce is inimical to the interests of everyone concerned. But is the onesidedness, the unreasonableness, all on one side? Are employers all angels; and workmen, if Trade Unionists, all devils?

This ranging of employers in one camp and employed in another, with a supposed irreconcilable antagonism of interests between the two, is the curse of modern industrial life. But vindictive, punitive wars, waged by employers in combination against men whose great crime is that they have combined, will do more harm than good. Just as it will be necessary presently to remind the public that the English and the Dutch have got to live side by side in South Africa when this war is over, and that salted sores are ugly things, so, it seems to me, that a paper possessing the great influence among, and enjoying the unbounded confidence and respect of, employers, that the "JOURNAL" possesses and enjoys, should strive to moderate, rather than to incite, the feeling against Trade Unions as such. After all, education and enlightenment have done much—a fact more easily realized by contrasting the past with the present than by merely looking at the existing condition of things. Trade Unionism recognized by law is, with all its drawbacks, better than the factory and mill wrecking of the old days, when combination was illegal. Education and experience will do much more; but never will a peaceful state of the industrial world subsist until men and masters realize, and act upon, the fact that their interests are coincident and not antagonistic. Profit-sharing is ocular demonstration of the fact; and that way salvation lies.

I am certain you agree with much here written, and that you will not regard with hostility the suggestion—made as it is by one who is fully alive to the blunders and follies of Trade Unionisms, and to the exasperation often produced by their tactics—that, even against Trade Unions, it is possible to prove too much, and thereby to weaken the force of the many just criticisms that remain to be made.

F. G. N.

Nov. 14, 1899.

The Southern Association.

SIR,—In reading your commentary upon the Southern District Association's last meeting in the editorial columns of yesterday's "JOURNAL," I was struck by the remark, in this connection, that "before the days of technical associations there was no brotherhood among gas engineers, and gas-works were jealously shut up from inspection in the *bonâ fide* pursuit of knowledge." Until comparatively recently, I was of opinion that such a state of affairs had passed away with the growth of these Associations; but some time ago (less than two years), I happened to have to call upon the manager of a gas-works in the Southern Association district, and expressed a desire to view his works. To my surprise, permission to do so was refused me; the manager adding that nothing was to be gained by my seeing them. I took him at his word, though somewhat astonished that he would admit this to a stranger. During the course of further conversation, I casually mentioned the fact that I was a member of one of our National Associations, when I was informed, in a very supercilious manner, that they had a District Association in the South far superior in every way to the Gas Institute—namely, the Southern District Association of Gas Engineers and Managers. After this, I did not prolong the interview more than was necessary.

It is somewhat of a coincidence (or perhaps it is a cause) that such a superior Association as the Southern District should be suffering from a difficulty in providing papers, and a mournful lack of interest in the meetings; while some of its members (though I hope there are no more than the one I have met) appear to be representatives "of the gas management of some undated past." If such a spirit as that manifested to me is at all common, or if it be shown at the meetings by only a few of the members, it is, in my opinion, sufficient to account for the doleful speeches of the officials at recent gatherings. I do not wish to infer that this is the case, but only suggest it as a possible reason.

I must, in justice, add that I have met a few members of the Southern District Association, other than the one referred to above, from whom I have received nothing but courtesy and kindness. I enclose my card.

A NORTHERN MANAGER.

Nov. 15, 1899.

Water-Finding by Divination.

SIR,—With reference to the two questions asked in the quotation from the article by Mr. C. V. Boys, in "Nature," which appeared in the "JOURNAL" for the 7th inst., I beg to say, first, that I can locate hidden springs of water wherever they exist, without any previous knowledge of the geological formation as to either the lie or the appearance of the land. Nine-tenths of my engagements are on estates to which, previous to my visit, I have been a total stranger; and when I go I never ask any questions, and do not expect to have any information, except as to my client's requirements—in fact, I prefer not to be influenced by any communication. When I arrive, I generally start work at once upon my own responsibility and method; relying wholly and solely upon the indications of the divining-rod, by which alone I am guided in my search. I am open to go anywhere or in any country, and will guarantee to find a spring of water if one exists; and as to the exact spot, it matters not to me whether it is convenient or inconvenient. I cannot choose. Sometimes it is favourable, sometimes otherwise; yet I do not believe in humbugging anyone to obtain personal advantage. With regard to the second question, the divining-rod has to do with the success of the undertaking inasmuch as it acts as an indicator, which is fully explained

in my book. With reference to the preposterous "scientific explanations,' they are the result of my own investigation and experience during upwards of twelve years' work in all parts of the country. After you have carefully perused my book, I am quite sure the facts will speak for themselves, and you will arrive at a different opinion of my work and method.

B. TOMPKINS.

Chippenham, Nov. 13, 1899.

[In complying with Mr. Tompkins's request to publish the above letter, we do so in order to afford him an opportunity of answering the two questions put by Mr. Boys, and not as an admission that we have, as he says, done him an "injustice" in our reference to this matter. The remarks made in the "JOURNAL" for the 7th inst. were by Mr. Boys, as was distinctly stated; and therefore Mr. Tompkins should have addressed to "Nature" his complaint of "injustice." When noticing his book on the 18th of July, we stated that he regarded the power of divining for water as an "electric force" accompanying a highly sensitive nature, and not as depending upon the will or cleverness of the operator. We have been careful to keep an open mind on the results of the water-diviner's work, and have recorded them, as items of news, from time to time in our columns—a case at Foulridge, near Colne, being noticed only last week. We should no more think of denying the possession by Mr. Tompkins of the mysterious "electric force" about which he speaks in his book, than we should of asserting that the members of the Society for Psychical Research have not idiosyncrasies which differentiate them from ordinary people.—ED. J. G. L.]

With reference to the theory of the "mystery" of water-finding by so-called divination advanced by Mr. C. V. Boys, as quoted a fortnight since in the "JOURNAL," a correspondent draws our attention to a curious story which is contained in the "Percy Anecdotes." It is to be met with under the heading of "Water Scenters," and, if well founded, goes far to show that cattle, at any rate, will scent water at a considerable distance, and are even sensible of the approach of rain. It may be that there are human scenters just as there are four-footed ones; and many interesting data bearing out this view will be found by the curious in the chapter on "The Divining-Rod" in Mr. Baring Gould's well known work on "Myths of the Middle Ages." Most people will probably coincide with the writer of this interesting book, who believes that imagination is the principal motive force in those who use the divining-rod; but, as Mr. Baring Gould cautiously adds, the powers of Nature are so mysterious and inscrutable, that we must be cautious in limiting them, under abnormal conditions, to the ordinary laws of experience.

LEGAL INTELLIGENCE.

SOUTH-WESTERN POLICE COURT.—Thursday, Nov. 9.

(*Before Mr.* E. W. GARRETT, *Magistrate.*)

Special Gas Acts and the London Building Act—The Wandsworth and Putney Gas Company Secure a Favourable Decision.

In this case the Wandsworth and Putney Gas Company were summoned by the London County Council for contravening the London Building Act of 1894, by neglecting to comply with the requirements of a notice to set back a new building, so that every part of its external walls should be at a distance in every direction not less than the distance permitted, under Part II. of the Act of 1894, from the centre of Waterside and Worple Road, whereby they became liable to the penalty prescribed by section 200 (sub-section 2) of the Act.

Mr. F. F. DALDY appeared for the County Council; Lord ROBERT CECIL, Q.C., for the Company.

Mr. DALDY, in opening the case, said it raised the question of the right of the Company to erect a purifying-house at the corner of two streets near the river, having regard to the provisions of the London Building Act of 1894. His contention was that the building was too near the centre of two roads—Waterside and Worple Road. Waterside was the narrower street of the two. It formed a continuation line of communication with other streets, and therefore was of some importance. At the point in question, it was 11 or 12 feet wide; and the rule being that a building was to be set back 20 feet from the centre of the roadway, meant a considerable withdrawal of the new building. Regarding the Worple Road, the withdrawal would be, perhaps, only 2 or 4 feet. Section 13 of the Act prohibited the erection of any new building in such a manner that any external wall should be at a less distance than the "prescribed distance" from the centre of the roadway, which was defined to mean 20 feet from the centre of a roadway used for carriage traffic, and 10 feet from the centre of a roadway used for foot traffic only. There was a widening of the Worple Road in 1890; and, measuring from the centre of the roadway as existing immediately before the widening, the building would still have to be set back. Section 14 provided for the service of notice requiring the owner or occupier to set back any new building which was less than the distance permitted under the Act; and, if he did not comply, he was liable to punishment. It would be admitted that the land was land on which the Company had a right to build. By section 31 of their Act of 1856, they were empowered to purchase and use land and buildings to any extent not exceeding 5 acres; and by an Act of 1866 extended powers were given. Section 4 entitled them to erect works on land specified in the schedule to the Act. Section 25 was also of importance. It said: "Nothing in this Act shall extend to, prejudice, diminish, alter, or take away any rights, powers, or authorities vested, or to be vested, in the said Metropolitan Board of Works, District Boards, and Vestries." These words were general, and worth attention, because not only would they seem to cover, in express terms, any land that was acquired under this Act on which buildings were erected, but it was a strong indication of the tendency of the Legislature. A further Act was obtained in 1880; and section 2 empowered the Company to purchase additional land not exceeding 10 acres. After a passing reference to the Metropolis Management and Building Acts Amendment Act of 1878, Counsel said he understood it was going to be argued that the land was subject to a special power under the Acts, which enabled the Company to over-ride the provisions of the Building Act. The result of this would be that a Company might well acquire land at two corners, and erect offices, or even buildings for manufacturing purposes; and they would be able to bring themselves up to within a comparatively short distance of the centre of the roadway, whereas all the private owners would have to set their houses back, and make a somewhat useless widening of the roadway. There was really no distinction at all under the Acts between a gas company and an owner of private property. He submitted that, if a Private Act was going to over-rule the provisions of a General Act, it was well established that it must be done in express words; it was not allowed to be done in a Private Act by implication. There had been cases on the point. There was the case of the City and South London Railway Company who wanted to build a station, and that of the London School Board who built a school on a certain site. In each of these cases, it was held that, inasmuch as the statute authorized a particular building to be put up there, the General Act could not over-rule it. That was not so in this case. The Railway Company and the School Board required to use a particular site for the particular object in view; and the intention of the Legislature in giving these powers would have been entirely defeated unless they had been allowed to build out a certain distance. In the Gas Company's Acts, there was nothing to show there was any intention to put them on a different footing from any private owner of land.

Mr. *T. W. Barry*, Architect and Surveyor under the London County Council, was first called. He stated that he visited the Company's premises on March 3 last, and found the new building had been begun. The trenches were half dug; and the concrete for the foundations was being put in. He called the attention of the foreman to the fact that the building was going out beyond the prescribed limit. The building was 23 feet high and 158 feet long in the Worple Road. The width of this road was 21 ft. 10 in. in one place, and 28 ft. 10 in. in another. The Waterside was 10 ft. 8 in. and 11 feet wide. The whole of the building came within 20 feet of the centre of the roadway. To reach 20 feet from the centre of the roadway, the building would have to be set back 1 foot in Worple Road, and in Waterside about 15 feet. In saying 1 foot for the Worple Road side, he was reckoning the centre line of the old roadway before it was widened.

In cross-examination, witness was asked whether he had seen any considerable traffic in the Worple Road; and his reply was that he had seen carts there. He should say there was traffic there other than that belonging to the Gas Company. He did not know that the whole of the property in the neighbourhood had been bought by the Gas Company. The building was not beyond the building line; and to put it back would not improve the street, excepting just where it was.

Lord CECIL, in opening the defence, said it was true that, if the Act applied, this building had been erected within 20 feet of the centre of the roadway; but his contention would be that the Act did not apply to a building erected on this particular site. His Worship was well aware that the decisions in the Courts amounted to this: That, where there was a General Act and a Special Act dealing with the same subject-matter, the General Act and the general rule were over-ridden by the Special Act. The Company's Act of 1880 provided that it and the 1866 Act should be read as one; and therefore section 4 of the latter was to be read into the 1880 Act. The section said: "The Company may on the land scheduled under this Act erect such gas-works as they think fit." There was no section so clear as this one that had been decided on by the Courts. The Act of 1880 gave power to take additional land by agreement, and express permission to erect what works they thought fit on the land prescribed in the schedule. Section 30 of the same Act was very important. On other land, the Company might erect "dwelling-houses, cottages, &c.;" but there was a proviso in the section which said that these should not be exempt from the provisions of the Metropolis Management Act of 1855 and the Acts amending the same. The schedule in the Company's Act distinctly described—taking, for example, plot E—so many roods, poles, &c.; and on this specifically described and bounded land the Company might erect such gas-works as they thought fit. His friend almost admitted, if the section stood in that way, they would be exempt. Section 25, which began in this manner, defined the purpose of the Act: "Where any works to be done under the Act should be made to pass under, or interfere with, any sewer under the control of the Metropolitan Board of Works, &c., or shall or may affect the sewerage of the district under the control of the Metropolitan Board of Works, the Company shall give notice," &c. This showed that the section was expressly formed so that it should only come into being when the buildings were likely to affect the drainage operations. There was no reference to the Building Act in this section. It went on to say: "Nothing in this Act shall take away the powers vested in the Metropolitan Board of Works," &c.—that was, so far as this particular clause was concerned, all their powers and rights were to be unaffected by anything in the Act. The section had no connection with the Building Acts at all. The last proviso was that, if there was any difference between the engineers the matter was to go to arbitration; and his friend ought to go to arbitration if he had any grievance. Calling attention to the authorities on the case, he said the first was *The Limehouse District Board of Works v. The London and Blackwall Railway.* The argument which applied in that case applied here: The Gas Company were authorized to erect gas-works; and if they were stopped, they could not supply gas. It might be a question of degree, but it was the same argument. Then there was *The London County Council v. The City and South London Railway.* The Council wanted the Company to set back a station; and the Magistrate convicted, on the ground that it was not necessary that any part of the station should be beyond the general line of buildings. There was an appeal; and both the Divisional Court and the Court of Appeal decided that the building could not be set back under the Building Act. Lord Justice Lindley said: "It appears to me that the view taken by the Magistrate was wrong. The term 'necessary works' in the Railway Act means works necessary for the purpose of their undertaking without reference to any position of the works, provided they are within the land

shown on the deposited plans. It is not within the power of the Council to declare to the Company how the Company shall make their buildings." Counsel submitted that this rule was a much less strong case than the one now before his Worship, because the words in that were "buildings as may be required for that purpose," whereas here the words were "any buildings they may think fit." The Company were given a special right to erect a building even if, by such erection, they contravened the provisions of the Building Act. In conclusion, he referred his Worship to section 205 of the Building Act, 1894, which had been re-enacted in the Act of 1898. It said: "Nothing in this Act shall in any way take away, alter, or prejudice, or affect, any of the powers, rights, and privileges conferred upon a gas company by any Act of Parliament, and as existing immediately before the passing of this Act."

Mr. *Harry Herbert Jones*, the Engineer of the Company, was then called. He first produced plans showing the scheduled sites. The building was on land marked E, scheduled in 1880; and it was such a narrow strip that, if any were taken off, it would not be of any value for scheduling—in fact, it was so narrow, that they had had a great deal of trouble in building on it. They could not carry on their business unless they were allowed to erect the building. They had experienced very great difficulty. Only on the previous Saturday night, one of the purifiers burst owing to the pressure of the increased make of gas. It was absolutely essential to have new purifiers. They supplied about 1800 street-lamps. It was necessary to erect a building of the size of this one. The consumption increased at the rate of 7½ per cent. last year, and 12 per cent. in the present year; and the building was the smallest they could do with. The Company were proposing to apply for further powers. There was practically no traffic on the roads in question, excepting to a public house, which the Company had acquired, and were going to extinguish the license.

Cross-examined, witness said the land on which the building had been erected was part of plot E in the schedule of the Act of 1880. It was pointed out to him by Mr. Daldy that the schedule referred to the land being bounded on the east partly by a strip of land separating the premises from Worple Way; and witness stated that the strip had been subsequently acquired. To his knowledge, the building did not stand on that strip, but entirely on the land scheduled. The building contained four purifiers, 40 ft. by 36 ft. by 8 ft. deep; and it was so arranged that they could extend it. If they had to take a foot off the building along the Worple Road, and 14 feet off it along Waterside, it would demolish the whole of the purifiers. They were built up to the boundary. If the building were a foot narrower, they would not have space to work. The purifiers had not been put into operation yet; but they must bring them into use all at once. A large gasholder wss being erected close to the new house; and to the south of the building and Worple Road, there was some space occupied by workshops and stabling.

Re-examined: The vacant land referred to was not scheduled.

Mr. *Henry S. Freeman*, who was Engineer of the Company until 1898, and is now a Director, said the land on which the purifiers had been erected was acquired in 1875, and was scheduled in the Act of 1880.

By His Worship: Witness had not a conveyance present to show where the footway came in the Worp'e Road. He did not think the building came beyond the line of frontage.

Cross-examined: They had at present four purifiers about half the size of the new ones; but they were dangerous to use now. They would require even more purifiers. It would have been possible, but most inconvenient, to have put the building nearer to the new gasholder; there was only just room enough now.

Mr. *E. H. Stevenson*, M.Inst.C.E., stated that he had examined the works, and thought it absolutely necessary to have the purifiers. He was surprised to see how the business had been carried on with the present purifiers. There must have been very great difficulty, as was proved by the accident to one of the purifiers. Smaller purifiers would not suffice; and, moreover, when the Company again went to Parliament, modern legislat'on as to purity would be put upon them.

Cross-examined: The building could not be set farther back, because the Company had built absolutely up to the edge of their land. It was true they had more land on which they were constructing a gasholder tank; but they had no authority to put works of manufacture on it. They were going to ask Parliament for more land; but this work was very urgent. Even last winter, the Company purified certainly 75 per cent. more gas than they ought to have done with their existing apparatus.

By Lord Cecil: The Company were going to ask for power to stop up Worple Road; and as there were no inhabitants, he did not think there would be any objection.

Mr. *H. E. Jones*, M.Inst.C.E., Vice-Chairman of the Company, corroborated the previous witness's evidence.

Tuesday, Nov. 14.

On the resumption of the hearing to-day,

Mr. *Peter Dodd*, the Surveyor of the Wandsworth District Board of Works, examined by Mr. Daldy, said he was able to say of his own knowledge that the Worple Road was widened in 1890. He produced a plan agreed to between the Board of Works and the Gas Company at the time of the widening. It showed a cottage, one part of which projected out towards the Worple Road more than the rest. The Gas Company's new purifying-house came up to the edge of the road.

By Lord Cecil: Witness could not say that the scheduled land was bought for the purpose of building on, as it was before his time.

By Mr. Daldy: Prior to 1890, there was a strip of land between the cottage and the roadway; but after that, he believed the extreme projecting part came close to the edge of the road.

There was considerable discussion on this point, in the course of which Mr. *Barry*, Mr. *H. H. Jones*, and Mr. *Freeman* offered further testimony. The last-named witness emphatically declared that the land on which the cottage stood was part of the land which was scheduled in the Company's Act, and none of it on the strip which bordered it. He did not think the building came beyond the old projection of the cottage; it was in line with it.

Lord Cecil, in concluding his case, said, as the matter stood, they had evidence that the building stood on scheduled land. He did not know how his friend proposed to use this point as to the projecting part of the cottage, unless he was going to say they had infringed the Building Act, because they occupied the space shown between the fence of the cottage and the road; but in any case, if his Worship had any doubt about it, he should submit that the point raised was not on this summons, because the summons was founded on the penal notice. The notice of the Council required them to set back the new building so that every part of the external walls should be in every direction not less than the distance permitted by the Act of 1894 from the centre of the roadway. But it was conceded that, if the Company set the building back to the extent required, they would not be able to build on a large part of their scheduled land. The notice unquestionably required the Company to do more than they were bound to do; and the summons was for not complying with that notice. If, however, the Council asked the Company to do that which they were not entitled to ask them to do, then they need not comply; and he submitted that they were not bound to comply. That was the only point.

Mr. Daldy said the point as to the Worple Road was not difficult at all, because the land on which the Company had the power to extend under the Act of 1880 was plainly described as bounded by a strip of land; and evidence had been given to show that the Company's building came upon this strip of land—not only where the cottage projected, but right along. But the more serious question referred to the Waterside end of the building. He should like to point out that in sections 13 and 31 of the Building Act railway companies had express exemption, but gas companies had not. He believed, however, in section 121, there was an express exemption and saving in favour of gas-works; but this had reference to dangerous and noxious business. Therefore, if it was desired to give a gas company exemption from a particular thing, it was expressly given. Then they also found exemption for gas companies in regard to the strength of walls and special and temporary buildings; but it was the exemption in section 205 on which his friend relied: "Nothing in this Act contained shall in any way take away, alter, prejudice, or affect any of the powers, rights, and privileges conferred upon a gas company by Act of Parliament." What his friend contended was that this general provision exempted a gas company from the provisions as to the streets and so on for which, and from which, a railway company was expressly exempted, and gas companies were not. The section could not have any such meaning as was put upon it by his friend; but inasmuch as there possibly might be in the course of the Act—either in the provision as to noxious business or temporary buildings, or matters of that kind—something which would affect gas companies' powers, the clause was put in to prevent any power which really existed at the time, and which they really had, from being taken from them. Had they any power of the sort suggested by his learned friend? That was the question. Counsel then proceeded to direct attention to the whole of the legislation bearing on the subject in its chronological sequence—mainly for the purpose of showing that no powers had been given to enable the Company to override the ordinary building regulations. If, he argued, it had been intended they should have such powers, they would have been expressly stated. Regarding the reliance placed by Lord Cecil on the power given to the Company to use the land specified for manufacturing purposes, he (Mr. Daldy) held that the effect of that power was not to over-rule any common-law right, but to confine the Company's manufacturing operations to the particular specified lands, and not allow them to spread all over the place.

His Worship, in giving his decision, said in this case the question arose as to whether the particular works referred to came within section 13 of the London Building Act, which prohibited the erection of buildings within 20 feet from the centre of the roadway. This depended really and entirely upon section 4 of the Company's Private Act of 1866, which provided that "the Company may, on the land scheduled under this Act, erect such gas-works as they think fit." He might say at once that, had it not been for the authorities cited by Lord Cecil, he should have been inclined to take the view put upon the section by Mr. Daldy—that the Company's power to erect was to be limited to this land, and that it did not apply to the buildings so erected. However, in section 205 of the Building Act of 1894, there was a general exemption referring to gas companies; but it was said that, inasmuch as there were certain special exemptions, in certain sections, of gas-works and railway works, this section could n t be looked upon as a general exemption from the provisions of the Act. He did not quite agree with this. He felt that the section was deliberately inserted. There was, it was true, a special provision with regard to railway companies; and he thought the reason that this special provision was introduced, was because there had been decided cases at the time upon the question as it related to railways, and the question that had now arisen was not thought likely to arise in case of gas companies. The special provision inserted with regard to gas companies had to do with nuisance in the process of manufacture of gas; and it occurred to him that the general provision was inserted in the interests of gas companies, in order to cover any case not specially provided for. Therefore he thought considerable importance must be attached to section 205. As to the necessity of these works, he found as a matter of fact that this building was necessary in this sense, and in this sense only: The land that was allotted in the schedule to the Act was of an extremely limited character; and the evidence was quite clear that this land was all wanted. According to the evidence, the Company would have to apply for further powers. The Company would be placed in a serious position if they were not allowed to use the whole of the land; and therefore in that sense only, he held that the building was necessary. The first case quoted was that of the London and Blackwall Railway and the Limehouse Board of Works. He had read this case carefully more than once; and he could not see in principle any distinction between that case and the present one. In that case the Company were authorized to take land, and to erect such station and works upon it as they thought necessary. They erected a station on the land beyond the line of building; and the Court held that, inasmuch as the fact of holding them bound to the line of building would be to deprive them of some of the land, the Special Act was not superseded by the General Act. He thought this reasoning applied here. If the Gas Company were not to be allowed to use all the available space for the purpose of their undertaking, they would be deprived of some of the rights and privileges conferred by the section. In the London School Board case, the Board were authorized to acquire land for the purposes of their

schools, and a building was erected within 20 feet from the centre of the roadway. It was held that the result of enforcing the General Act would be to deprive them of the special powers which had been given them. The case of the Grand Junction Water Company and the Hampton District Council really turned upon the construction put upon a special provision which did not exist here. Then, in the case of the City and South London Railway, Parliament must have been aware of the existence of the building line when they authorized the erection of the station. The two decisions which seemed to bind him were those given in the London and Blackwall Railway and the London School Board cases. He was clearly of opinion he was bound by them. With regard specially to Worple Road, even assuming that he held that the Company had to some extent gone beyond the scheduled land, still the evidence did not satisfy him that he should be justified in calling upon them to comply with the notice in this particular case. The summons would be dismissed, with ten guineas costs.

Uckfield Rural District Council v. Crowborough Water Company.

At the Mark Cross Petty Sessions last Tuesday, the Clerk (Mr. A. T. Simpson) stated that, in the matter of the *Uckfield Rural District Council v. Crowborough Water Company*, in which the Bench stated a special case, he had received the judgment of the High Court, which ordered that the matter be remitted to the Magistrates to convict (*ante*, p. 1067). He had received notice that the respondents would not be present at the Court that day. Mr. J. Taylor, Surveyor to the District Council, proved that the Water Company erected a water-tower at Crowborough. They did not send plans, neither did they give any notice of the work. Mr. Holman, who appeared for the District Council, said they had no desire for a heavy penalty; and the Bench ordered the payment of a fine of £1 in each of the two cases, including costs.

Committal of an Infringer of the Welsbach Company's Patents.

In the Chancery Division of the High Court of Justice last Friday, before Mr. Justice Kekewich, Mr. Bucknill appeared in support of a motion for the committal to prison of George Collins, for breach of an injunction granted on July 11, 1896, restraining him from selling or using mantles which were an infringement of the Incandescent Gas-Light Company's patents. The defendant had been committed on a previous occasion for a similar offence, and had spent a month in prison. Counsel said he had evidence that on two occasions Collins had sold infringing mantles. The defendant, who was in attendance, said he was given to understand, by the person who supplied him with the mantles, that they were not infringements. His Lordship: You know that an injunction has been granted restraining you from selling these mantles. Defendant: I do. His Lordship: Then why do you go on selling them? Defendant said he had applied to the Welsbach Company to supply him with mantles, and they would not do so. He had a wife and seven children to support; and if the Court would give him another chance, he would never offend again. Mr. Bucknill pointed out that, on the application for discharge on the previous occasion, defendant made an affidavit in which he stated that he would abandon the sale of mantles altogether, if he were liberated. His Lordship warned defendant that if he committed any further breach he would get himself into serious trouble. For the present offence, he would have to go to prison for seven days, and pay the costs of the motion.

Incandescent Gas Lighting in Vienna.—The public lighting of an experimental area of Vienna by Welsbach mantles cost £123 19s. 2d. for gas and £21 8s. for mantles, as against a cost of £262 10s. 7d. for the same area lighted by means of ordinary flat-flame burners.

Carbon Monoxide in San Francisco Gas.—According to a recent Foreign Office report, the large number of deaths from asphyxiation by gas that have taken place in San Francisco during recent years, either by accident or with suicidal intent, have had the effect of directing official attention to the quality of the city's illuminant. An analysis shows that the gas furnished by one Company contains an average of 16·44 per cent. of carbon monoxide, while that supplied by other makers contains no less than 24·33 per cent.

Gas Developments at Nottingham.—It is interesting to learn that at Nottingham there has been such a growth in the consumption of gas during the past three months as has not been equalled in the twelve years during which Mr. W. R. Chester has had the management of the department. This is due to the increasing use of cooking and heating stoves, the use of slot meters, and the general improvement in the trade of the city. As compared with the corresponding period of last year, there are 2000 more meters fixed at the present time. Inclined retorts and coal and coke elevating and conveying machinery are about to be introduced at the Eastcroft works.

Portsmouth Water Company.—At the half-yearly meeting of this Company next Thursday, the Directors will report that the available balance on the profit and loss account for the six months ending Sept. 30 is £24,552, out of which they will recommend the payment of full statutory dividends. This, after deductions for void houses, &c., will leave a balance of about £9017 to be carried forward. During the half year, 2678 yards of additional street service mains were laid in new roads; making a total of about 46 miles of trunk mians and 126 miles of street service mains. The number of additional services connected with the mains was 444; making the total number of premises under constant supply by the Company in all the districts 39,317. The quantity of water pumped from Havant and Bedhampton was 1,335,426,000 gallons, or an average daily supply for all purposes of 7,343,000 gallons; being an increase of 475,000 gallons daily, as compared with the corresponding period of last year. The quantity supplied for domestic use was equal to an average of 28¼ gallons per diem per head of the population, exclusive of all supplies by meter. The Engineers (Messrs. Joseph Quick and Son) report that the Company's engines, boilers, reservoirs, and works are in good order. It is satisfactory to learn from the report that the drought of the past summer did not affect to any material extent the springs of the Company; the supply of water having continued to be constant and abundant to the whole of the districts.

MISCELLANEOUS NEWS.

PROJECTED GAS LEGISLATION FOR THE METROPOLIS.

Additional Capital for the Gaslight and Coke Company—The South Metropolitan Company and the Nine Elms Works. Suggested Alteration of the Sliding Scale—The London County Council and the Testing and Sale of Gas.

The notices have been issued of intended applications to Parliament by the two largest Gas Companies in the Metropolis and by the County Council; and, as will be seen by the summary given below, important changes in connection with the gas supply of South London, arising out of the parliamentary inquiry of the present year, are proposed.

Dealing first with the larger of the two undertakings concerned, the Gaslight and Coke Company notify their intention of applying for authority to raise additional share and loan capital by the creation and issue of ordinary, preference, or debenture stock, and other share and loan capital; to create and issue new shares and stock, mortgages, and debenture stock; to borrow further moneys; and to attach to any such new shares or stock such priorities, rights, privileges, exemptions, advantages, or conditions as may be found desirable, or as may be authorized by the Bill. The Company will seek power to apply to any of the objects or purposes of the Bill, or of the undertaking, any capital, moneys, or other funds in their hands, and which may not be required for the purposes for which they were authorized to be raised; also to make provision for the increase of the insurance fund of the Company in proportion to the additional capital to be created under the Bill, and to enact all such other consequential or incidental provisions in relation thereto as may be found necessary or expedient. Provision is to be made for the purchase and acquisition of certain specified lands at East Ham, on which to construct works for the manufacture and storage of gas and residual products, and such additional lands as may be required for the general purposes of the undertaking. The Company will also apply for an extension of the time for the sale of all or any of the superfluous lands in connection with their undertaking, and for further powers with reference to the retention, sale, or disposition of such lands; also for the repeal, alteration, amendment, and extension thereto of the provisions of the Lands Clauses Act, 1845. The Bill to be applied for will, or may, repeal, alter, and amend all such rights and privileges as would interfere with any of its objects, and confer other rights and privileges; and also alter, amend, and make applicable to its purposes, all such provisions as may be necessary of the City of London Gas Act, 1868, the various Acts of the Company, and the Schemes of Amalgamation and Orders in Council made thereunder. It will, or may, incorporate with itself, *in extenso* or by reference, with or without alteration, such of the provisions as may be deemed expedient of the Lands Clauses Acts (except the provisions with respect to the purchase and taking of lands otherwise than by agreement), and the Companies Clauses Acts.

The other application is by the South Metropolitan Gas Company, who have given notice of their intention to apply for parliamentary sanct on to the transfer to them of "the portion of the undertaking of the Gaslight and Coke Company on the southern side of the River Thames"—that is to say, the Nine Elms station of the Company—on terms to be agreed upon between the two Companies. The applying Company wish to be empowered, subject to the provisions of the Bill, to carry on the transferred undertaking, and to extend the limits of the Company for the supply of gas, so as to include the several parishes and places in that part of the County of London which constitute the gas limits of the Gaslight and Coke Company, and within those extended limits to exercise the powers, authorities, rights, and privileges of the Company with respect to the manufacture, distribution, and supply of gas within their existing statutory limits—subject to such alterations and modifications as may be defined in the intended Act. The transferred undertaking will be constituted for all purposes a part of the existing undertaking of the purchasing company; and it is proposed to alter the rates, rents, and charges leviable by or payable to the Gaslight and Coke Company for or in relation to the supply of gas. The Bill to be promoted will empower the two Companies to enter into and fulfil agreements for and in relation to such transfer and vesting, and to confirm, with or without alteration, any agreements which may have been, or which, during the progress of the Bill, may be entered into touching the above-named matters.

The Company propose to alter the illuminating power of their gas, and the standard price to be charged therefor as fixed by their Act of 1876, and also to alter the variation of dividend dependent on the increase or decrease of such standard price as provided for by their Act of 1896, and in lieu thereof to establish "a variable standard price dependent on a variation in the illuminating power with an increase and decrease of dividend dependent on the decrease or increase of the price of gas supplied, and of the illuminating power thereof." They wish to be empowered to make and enforce regulations as to the sale and price of gas supplied by means of slot meters, and as to the price, terms, and conditions of such meters, and the fittings connected therewith. They propose to alter and amend the provisions as to the form of their accounts, and to provide that they shall show the amount of the capital, and the premiums thereon from time to time, in cash actually raised and expended, and the nominal amount of ordinary capital and debenture stock for the time being on which dividend and interest are payable.

Authority will be sought for the construction in Greenwich of a line of railway from the Angerstein branch of the South-Eastern Railway to the works of the Company, and for the purchase of lands, compulsorily or by agreement, for the purpose; and they will ask to be invested with the usual powers conferred upon railway companies, and especially those granted by the 16th section of the Railways Clauses Consolidation Act, 1845. It is proposed to ask for power to levy tolls, rates, and charges in respect of the railways; and to appropriate any lands or buildings belonging to the Company for the erection of dwellings for the labouring classes, and sell or let them. The Company desire to be authorized to enter into an agreement with the South-Eastern Railway Company for the working and use of the projected railway. Additional capital will be applied for, to be raised by the creation and issue of new ordinary shares and stock, or debenture stock, and on loan. The

Bill to be promoted for carrying out the above-named purposes will extinguish all such rights and privileges as would interfere with any of its objects, and will confer other rights and privileges, and will repeal, alter, and amend—and, if thought fit, consolidate—all such provisions as may be deemed necessary or expedient of a number of Acts, among which are the following: The City of London Gas Act, 1868, and the Schemes of Amalgamation made thereunder; the South Metropolitan Company's Acts, and any other Act or Acts relating directly or indirectly to the Company or their undertaking; the Gaslight and Coke Company's Act, 1868, and any other Act or Acts relating directly or indirectly to the Company or their undertaking. It will also incorporate with itself, *in extenso* or by reference, with or without alteration, such of the provisions as may be deemed expedient of the Lands Clauses Acts, the Companies Clauses Acts, the Gas-Works Clauses Acts, and the Railways Clauses Acts.

The London County Council have given notice of a Bill to amend the Acts relating to the Gaslight and Coke, Commercial, and South Metropolitan Gas Companies. The scope of the measure will be as follows: To make further provision with reference to the testing of gas supplied within the County of London by the above-named Companies, and to provide for the use of a portable photometer or other similar means of testing the illuminating power of gas, and for the testing being conducted at any place within the districts of the Companies in addition to any test provided for under any Act relating to them. To prescribe the apparatus to be employed in such proposed testing, and the mode of conducting tests and recording the results thereof, or to authorize and provide for the making of regulations by the Board of Trade or the Gas Referees with respect to these matters. To provide that any of the Companies shall be liable to such penalties or forfeitures as may be prescribed in the Bill in respect of gas supplied by them as shall be found to be of less than the prescribed illuminating power. To fix, prescribe, and limit the charges to be made by the Companies in respect of meters, stoves, and fittings, and to fix and limit the charge for gas supplied through slot or automatic meters; also to provide for the fixing and authorizing of standard fittings, stoves, and meters to be supplied by the Companies. It is proposed to require the Companies to issue to the consumers statements with regard to the sum charged, and the method in which it is made up; and to make further provision with respect to the Companies' accounts, and provide for the method in which the profits arising from the sale of gas through slot or automatic meters and otherwise should be appropriated and applied. The portions of the preceding notice relating to the charges made for gas supplied through automatic meters were inserted in virtue of a recommendation made to the Council last Tuesday, by the General Purposes Committee, that an attempt should be made to give effect to the views of the Metropolitan Gas Inquiry Committee on this matter by means of provisions included in the "Portable Photometer Bill."

THE MANUFACTURE OF SULPHATE OF AMMONIA AT MANCHESTER.

Local Government Board Inquiry.

On behalf of the Local Government Board, Mr. H. H. Law sat at the Town Hall, Manchester, last Tuesday, to consider an application by the City Council for power to borrow £25,000 for the erection of a plant for the manufacture of sulphuric acid from spent oxide and the manufacture of sulphate of ammonia from ammoniacal liquor at the Bradford Road gas-works.

Mr. T. Hudson, the Deputy Town Clerk, informed the Inspector that the question of the manufacture of sulphate of ammonia was fully inquired into by the Local Government Board in 1896; and as a result both the Board and Parliament had sanctioned the principle of the Corporation manufacturing the residual products from their gas-works. What they now desired to do was to convince the Board that it was expedient to put the principle into practice, and that the plant they proposed was suitable for the purpose.

Alderman *R. Gibson*, Chairman of the Gas Committee, gave evidence to the effect that the Committee had carefully considered this question, and thought it desirable in the interest of the ratepayers that the department should work up their own residuals.

Mr. *Thomas Newbigging* said the site of the proposed residuals works at the Bradford Road station, on which it was intended to erect the buildings, apparatus, and plant for the conversion of the ammoniacal liquor into sulphate of ammonia and for the manufacture of sulphuric acid ancillary to that conversion, was excellently well adapted for the purpose intended, was well situated, and of sufficient extent. The nearest houses were at a distance of 150 yards away; and these belonged to the Corporation, and were tenanted by men employed at the gas-works. With the superior modern appliances, under the supervision of the competent officials and workmen in the employ of the Corporation, the manufacture would be carried on with complete immunity from nuisance of any kind. The arrangements were such that, in the conversion of the gas liquor into sulphate of ammonia, the risk of nuisance would be less than in other works of this class, because, as the production of sulphuric acid would be ancillary to the other, the sulphuretted hydrogen gas produced in the sulphate manufacture would be utilized in the oil of vitriol plant. In this way the process would not only be an economical one, but a much needed object lesson would be given by the Gas Committee in the conduct of a manufacture in connection with which complaints not infrequently arose. He had gone through the specification and estimates, and had examined the drawings of the buildings, apparatus, and plant, prepared by Mr. G. E. Stevenson, the late Gas Engineer. In his opinion, the works therein shown and described, when carried out by a competent contractor, would be a model works of its kind. With all the best modern appliances and arrangements for conducting the operations with economy and success, considerable saving of labour in handling the materials, both raw and finished, would be effected by the large use of automatic machinery. The sulphate of ammonia plant, as designed, was of a capacity sufficient to produce 20 tons per day of 24 hours. The sulphuric acid plant would be capable of turning out about 78 tons of acid per week. Owing to the enhanced market value of sulphate of ammonia, and notwithstanding the rise in the price of materials of all kinds, the balance of profit arising from the manufacture would, at present prices, be greater than he estimated when he gave evidence on the subject at the previous inquiry in 1896. This profit would inure to the advantage of the inhabitants by cheapening the cost of gas manufacture, so enabling the selling price of gas to be reduced. In this way the use of gas for domestic and trade purposes would be encouraged; and this again would assist in the reduction of the smoke nuisance which so greatly aggravated the inconvenience and danger of fogs. Witness's estimate of the capital cost of the works was £25,000.

The specification and estimates of the late Mr. Stevenson were put in. The following is the summary of the estimate: Sulphate plant, £9480; acid plant, £9330; connections and valves to sulphate plant, boilers, and acid plant (including liquor pipes), £2500; boiler-house (with chimney), £1200; foundations for sulphate and acid plants (including sumps and drains), £2000; contingencies, £490—total, £25,000.

Mr. *Evan Williams*, Chemist to the Corporation Gas Committee, gave evidence as to the provisions made for preventing nuisance arising from the process.

There was no opposition; and the Inspector subsequently visited the site of the plant.

EXTENSION OF THE INCLINED RETORT SYSTEM AT THE LEEDS GAS-WORKS.

At the Meeting of the Leeds City Council on Monday last week, the Chairman of the Gas Committee (Alderman Lowden) moved that the Council approve of the acceptance by the Committee of Messrs. Graham, Morton, and Co.'s tender for the complete installation of twelve beds of inclined retorts at the York Street works, for the sum of £14,390. He reminded the Council that for some time there had been a similar installation on a larger scale at the Meadow Lane works, which had proved very successful indeed. There had been great economy in the carbonization of coal—in fact, he should be well within the mark if he said the cost was reduced by 1s. a ton. Mr. Batley seconded the motion. Mr. Henry said he had no objection to inclined retorts, but urged that they should be adopted in modern works. Unless there was a vast amount of air space, it would be found that while the work of some of the men was lessened, that of others was made more arduous. With reference to the Meadow Lane works, he stated that a large amount of the plant had had to stand idle on account of dilapidations in the beds. He also complained of the ventilation of the retort-house; adding that many of the men had fainted owing to its inefficiency. He hoped the Committee would adopt appliances for providing proper ventilation; and he recommended that wherever the inclined retorts were introduced a new house should be built. Alderman Lowden replied that Mr. Henry's intentions were no doubt good, but that his knowledge of the matter was rather indifferent. His statements generally were very greatly exaggerated. As to the condition of the Meadow Lane works, he could only characterize Mr. Henry's statements as gross exaggerations. Mr. Henry knew perfectly well—or ought to know—that the Meadow Lane Committee had spent something like £5000 or £6000 in the acquisition and removal of property, so that the retort-house might be efficiently ventilated; and that in consequence of the alterations the ventilation had been vastly improved. Mr. Henry remarked that it was not good yet. Alderman Lowden said it was about as good as it could be made. Mr. Henry had accused the Committee of having the place in such a state as to cause men to drop down in a dead faint, and had spoken as if this was a present-day occurrence. He (Alderman Lowden) admitted that before they cleared away the adjacent property the place was badly ventilated; and if Mr. Henry had said the ventilation was imperfect twelve months ago, he would have been within the mark. But now, so far from the works being a disgrace, the Committee had reason to be proud of them. People had come from all parts, and expressed admiration of the way in which the Committee had carried out the work. They had learnt a little; and at York Street they would avail themselves of the knowledge they had gained. At the same time, the works at Meadow Lane were very creditable to the Committee. The motion was adopted.

ORIENTAL GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held on Wednesday last, at Finsbury House, Blomfield Street, E.C.—Mr. J. Blacket Gill in the chair.

The Secretary (Mr. H. J. Luff) having read the notice convening the meeting, the report and accounts for the year ending June 30—to which reference was made in the "Journal" last week—were taken as read.

The Chairman said the history of the Company during the past year was very carefully shown in the report and statement of accounts; and really, it appeared to him, they left but little on which he need enlarge. The shareholders would, of course, observe, with great satisfaction, that the debenture debt had been all paid off; and the Company now owed no money at all on debentures. He had also no doubt they were pleased to see that the Directors had commenced a reserve fund—amounting altogether to £13,836, which was invested in what were called gilt-edged securities outside the Company. The only regret one felt on this point was that the fund was not started a good many years ago. But it was "never too late to mend;" and, as time went on, they would find themselves all the better for having a "shot in the locker," to meet evil times if they came. The Board also found they could place another £3500 to the exchange equalization account; and they thought it prudent to do so, though, he was glad to say, they had done better on exchange this year to the extent of £1670 than last year. At the same time, there was some amount of uncertainty about the question; and as they could afford to put this sum on one side—it was practically a reserve account—they considered it well to do so. Coal had cost them £1548 more than last year; and they had received an additional £711 in the way of gas-rental. He was sorry the amount was so small; but it

was on the right side. Coke and tar gave them an increase of £4388 over last year. This was a particularly satisfactory item. It was rather strange that coke and tar seemed to be selling well everywhere just at present—whether it was on the Continent, in this country, or, as they found, even in Calcutta. Then they had had 165 new lamps connected with their distribution system, and 149 new consumers; and they had laid 4 miles of new mains. It would be remembered that the last time he addressed the shareholders, he told them the Board were in hopes that the Company would obtain the contract for lighting Howrah for a further term of years. He was glad to say—though they had had to wait a long time for it—they had heard within the last week or so that the contract had been signed by the Commissioners of Howrah; and it was for fourteen years from the 1st of August last. In addition to this, there was the gratifying intelligence from their Manager that Howrah (which was a suburb of Calcutta) was decidedly looking up; and large works going on there, which would no doubt in time very much increase the number of the Company's consumers. Therefore, he thought they might congratulate themselves on this little piece of good news. He only wished he could say the same of Calcutta. As the shareholders were aware, the contract for that city terminated in May, 1901; and the Directors had lost no time in approaching the Municipality, and laying before them their views. He regretted to say there had been some little ebullition of feeling in the Municipality; and a certain number of the members had resigned, and notably two who were on the Committee appointed to consider the gas question. Of course, this was unfortunate, because it would probably still further delay that which they all desired—viz., a new contract with Calcutta. They were bound to anticipate the opposition of the Electric Light Company, who would endeavour to get all they could out of it—the same as the Gas Company would do. But he fancied that possibly the improved mode of lighting by the Welsbach system would, in the long-run, keep out the arc lighting of the Electric Light Company—at all events, it would be no fault of the Directors if they did not impress the residents of Calcutta with the great superiority of their own light over the electric light. There was no further information he could give on this point. The matter was before the Municipality; and they were expecting to hear from them—it might be in a month, or perhaps six months, they could not tell. Anyway, the shareholders now knew as much about the matter as he did himself. The Directors had every hope they would, in the long run, succeed; and though he did not wish to unduly increase the hopes of the shareholders, still he saw no reason why they should not be able to secure a contract for a certain term of years. They had asked for 21 years. The Board had received a report from the Engineer in which he stated that all the works were in good condition; the men seemed to be working very amicably; and everything looked fairly satisfactory in that quarter. The report and accounts were certainly very satisfactory; and he had pleasure in proposing their adoption.

Mr. H. D. Ellis seconded the motion.

Mr. Samuel Spencer said the position of the Company's affairs was a matter for congratulation all round. The accounts continued to improve year after year; and he was certain the shareholders were all delighted with them.

The motion was unanimously carried.

On the proposition of the Chairman, seconded by Mr. Ellis, a dividend at the rate of 8 per cent. for the twelve months was declared, free of income-tax, and less the 3½ per cent. already paid.

The Chairman next proposed, and Mr. A. T. Eastman seconded, the re-election of the retiring Directors (Messrs. R. Hesketh Jones and R. Miller). This having been agreed to, the Auditors (Messrs. S. W. Savage and W. Williams) were also re-appointed.

Mr. Ellis, in a few pertinent expressions, next moved that a donation of fifty guineas be made to the Transvaal Widows and Orphans Fund.

Mr. Robert Morton seconded the motion, which was heartily agreed to.

Mr. Spencer, in moving a vote of thanks to the Directors for their efficient services, intimated that he should like to give notice of a resolution to increase their fees.

The Chairman (interposing) remarked that it was very kind of Mr. Spencer to make this suggestion; but he was sure he could say on the part of every member of the Board that it was a pleasure to serve the Company, and that they were very well remunerated. Up to 1884, the Directors received between them £850 per annum; and in November of that year, they were awarded by the shareholders the considerable increase to £1200. He would therefore ask that the suggestion be allowed to fall through.

The motion having been unanimously passed,

The Chairman briefly responded, and then moved a similar acknowledgment of the services of the officers and staff, both at home and abroad. He spoke highly of the devotion of the Engineer (Mr. D. C. Niven) to the Company, and said in Mr. James C. Watson, the Assistant-Engineer, the Board believed they had a good man. Mr. Luff and his assistants also rendered excellent service.

Mr. Morton, in seconding, said he believed it was on his recommendation that Mr. Niven went to Calcutta a good many years ago. He knew him long before he went out; and he had watched his progress since with very great interest. He was very much gratified that he had proved himself such a good officer.

The motion having been cordially passed,

The Secretary replied; and this concluded the proceedings.

The Sheffield Gas Company and Army Reserve Men.—The Directors of the Sheffield United Gaslight Company have decided to make an allowance of 7s. per week each to the wives of the men in the Company's employ who have been called out, and further to re-employ the men on their return from the war.

Salford Gas Undertaking.—Last Wednesday, the Salford Town Council determined upon the expediency of promoting a Bill in Parliament for the purpose of carrying out a number of improvements in the borough. It was decided to insert clauses to empower the borrowing of £200,000 for gas-works purposes, and to use lands already in the possession of the Corporation for the manufacture and conversion of residual products.

BRIGG GAS ARBITRATION.

Thursday, Nov. 16.

(*Before Mr.* George Livesey, *Umpire.*)

This was an arbitration to determine the price to be paid to the Brigg Gas Company, Limited, for their undertaking by the Brigg Urban District Council in pursuance of the terms of their Act of the past session, the chief points of which have been noticed in the "Journal" (*ante*, p. 874). Mr. E. H. Stevenson was Arbitrator for the Urban District Council; Mr. H. E. Jones for the Company. Mr. Balfour Browne, Q.C., appeared for the Council; Mr. G. M. Freeman, Q.C., and Mr. Honoratus Lloyd represented the Company.

Mr. Freeman, in opening the case, said the Company came into existence in 1836, with a capital of £1600; the Lord of the Manor having given a piece of land on which to establish the works. In 1850, the works were removed to a more eligible site, to meet the expenses of which the capital was increased by £1100. In 1873, the concern was registered as a Joint-Stock Company, and was incorporated under the Companies Act of 1862. Various additions to the capital were made from time to time; and in 1885 the Company decided to purchase another piece of land for the erection of further works. There was difficulty about the purchase, however; and eventually the landlord granted a lease for 99 years at a yearly rent of £4 11s. 4d. Subsequently, but before there was any idea that the Local Authority wished to purchase, the landlord expressed his willingness to sell the land for £160; and this option was now available as regarded the District Council. Part of the works were on freehold and part on leasehold land; the area of the former being 3164 square yards, and of the latter 1460 square yards. In 1898, the Company found that the capital then authorized was insufficient; there having arisen a heavy demand for prepayment meters and gas-fittings. Further capital was therefore authorized. It was obvious that the concern was becoming larger than was originally contemplated; and it was thought advisable for the Company to put themselves in a statutory position by applying for a Provisional Order. The capital now totalled £10,000. The works were in a very complete state; most parts being considerably in excess of present requirements, besides which there was ample area for further extension. The Board of Trade granted the Order, fixing the capital at £10,000, with power to raise another £6000; the maximum price of gas being put at 4s. per 1000 cubic feet. The Order was followed by a Confirmation Bill; and at the same time, to the surprise of the Company, the Council promoted a Bill for the acquisition of the undertaking. When the Bill was before Parliament, the Council's representatives said they had practically no fault to find with the Company, but that it would be a good thing to have the gas supply in their own hands—that it would be a remunerative thing, and therefore the more welcome as they had several undertakings which would not be remunerative. The Company stated that they would much rather not be bought out, as they were doing well, and had a large future before them; and moreover transfer might entail hardship on the small holders of their shares, of whom there were many. Eventually, as a result of negotiations, the Company's Bill was withdrawn and the Council's Bill passed. Previous to 1895, the Company paid dividends of about 10 per cent.; but from that time they adopted the prudent policy of putting some profit to a reserve fund, with the result that the dividend fell to 9 per cent. in 1895 and 1896, 8 per cent. in 1897 and 1898, and 9 per cent. in 1899—the amounts placed to reserve in the years from 1895 to 1899 being respectively £68, £228, £64, £105, and £108. Although they were a non-statutory Company, they had always recognized that they ought to act very much in the same way as if they were a statutory Company, and had therefore from time to time reduced the price. There would be no suggestion that they had not done their duty in supplying gas in a satisfactory manner. The price, which was 5s. 10d. per 1000 cubic feet in 1875, had been reduced to 5s. in 1876, and 3s. 9d. in 1883, at which figure it now remained, except that there was a discount to consumers of £25 worth of gas per annum. Public lamps were supplied at 3s. 6d. per 1000 cubic feet. The consumption of gas had practically doubled since 1880; the figure in that year being 5,500,500 cubic feet, while for the year to June, 1899, it was 10,603,204 cubic feet. There was still considerable room for the growth of the distribution of gas in Brigg; the population being 3300, of whom only 2000 were taking gas. The district was very compact; and therefore there was little complaint of unremunerative mains. There was no electric light installation; and it was agreed that it would be impossible for the Council to work an electric undertaking against the gas. The income in 1897 was £677, in 1898 £885, and in 1899 £1008. The income of 1897 appeared to be very low; being a large drop from 1896. The reason of this was that in 1897 the Company applied a portion of the revenue to capital expenditure. These figures did not show the full advantage of the Company's position, because a large amount of profit was now being reaped from the introduction of prepayment meters. There was every probability, not merely that the income would remain as good as it was now, but that it would increase considerably. It seemed that the Company had not been allowing sufficient for repairs. The Manager did an immense amount of physical work. He not only managed the Company, but acted as foreman of the works, with the result that the repairs were done very cheaply. It was therefore suggested that a third of the Manager's charges should be placed to repair; and even then a further sum was added. In making the valuation, the Company's witnesses took the figure for profits according to the accounts; and then, believing the concern to be thoroughly sound, capitalized it at 26¾ years' purchase. It would at once be pointed out that this was a non-statutory Company; but there was nothing like the difference that used to exist between statutory and non-statutory companies, because it was now the practice of Parliament to deal with these matters in a very fair way. The theory of difference between the two was that a local authority could compete with a non-statutory company, refuse licences for breaking up streets, and make themselves generally disagreeable; but the invariable practice of Parliament had been not to allow a local authority to compete against a company. Continuing, he said they had a direct instruction in the Act that they were to consider, and make allowance for, surplus works. It was arguable that they should take the earning

capacity of the surplus works; but all that was claimed was structural value.

The UMPIRE: The earning capacity implies something else—that you would get the business to earn it.

Mr. FREEMAN: Yes.

The UMPIRE: You put it on the safer ground?

Mr. FREEMAN: Yes. Continuing, he said the valuers added the two items of capitalized income and value of surplus works together, and then allowed a further 10 per cent. for the sale being compulsory. In respect to the rent of £4 11s. 4d., they proposed to add this sum to the accounts and to deduct £200, to cover the cost of enfranchising it, and pay the expenses according to agreement. In this way, they arrived at a round sum of between £30,000 and £31,000.

Mr. *Frank Hett*, the Secretary of the Company, examined by Mr. LLOYD, said in 1898, when the Company applied for a Provisional Order, they had not the slightest idea the Council wanted to purchase the works. There were 65 separate holdings of shares in the Company. It was not until October, 1898, that the Company had any inkling that the Council desired to purchase. Prior to this, he approached the landlord of the leasehold part of the site of the Company's works with a view to purchase; but he asked them to postpone the matter for a year. Witness now had a letter in which the landlord offered to sell for £160 and expenses. This letter was dated Nov. 14, 1899—two days before.

Cross-examined: It was a matter of opinion as to whether it was a good or bad bargain to pay about £200 for a ground rent of £4 11s. 4d. The town had been growing very slowly in population, but not in the class of house that would take gas. He could not say that in the last fifteen years only 43 new houses had been built or had plans passed for them. The population in 1881 was 3087, and in 1891 2990. It was suggested that, as in a former case, the owner of the leasehold ground would not be allowed to sell; but witness thought there would be no objection in this instance.

Mr. *Corbet Woodall*, in reply to Mr. FREEMAN, said he accepted the figures of the accountants as the basis of his calculation. Having regard to the charges of companies of similar size, he considered those of this Company satisfactory. He handed in a table showing the price charged for gas by the first ten Companies in the Board of Trade returns selling between 9 and 12 million cubic feet per annum. Of these there was only one (the Eckington and Mosbro Company) whose price was lower than that of the Brigg Company. The works were excellently built, well arranged, and kept in good repair; and they enjoyed the advantage of a canal, by which coal was brought from Yorkshire and residuals carried away. The works were large enough to meet a demand considerably in excess of that at present existing. They were to a very large extent new works. At a small expenditure, they could be made to meet a demand three times greater than they were now doing. The growth of the business had been steady and regular. During the last ten years, it had averaged 3·1 per cent.; and in the last year, from 1898-1899, it had increased by 11¾ per cent. This was attributable partly to the prepayment meters and partly to the improvement in trade. The increase in prepayment consumption added about 3 per cent. over the whole of last year. The price of gas had been steadily reduced from 5s. to 3s. 9d. per 1000 cubic feet, besides which there was a discount of 10 per cent. to consumers of over £25 worth of gas. The dividends, which were maintained at 10 per cent. for a considerable period, were reduced to 8 and 9 per cent. from 1895 onwards, in consequence of the formation of a reserve fund.

Mr. BALFOUR BROWNE: The decrease was caused partly by creating new capital, and therefore having to pay interest on a larger amount.

Witness (continuing) said the capital expended to 1898 was £9771; the gas sold in that year being 9,488,000 cubic feet. The capital in 1899 was increased to £10,119; the sale in that year advancing to 10,603,000 cubic feet. The capacity of the works was 20 million cubic feet. When the sale amounted to that figure, the capital per million sold would be £700, instead of about £950 as at present.

The UMPIRE: Is 20 millions the capacity of the works?

Witness: What I have said is that the extension of the works would practically raise them up to that. There will have to be some further capital expenditure on gasholder capacity.

Only gasholder capacity?—Practically it is gasholder capacity only.

Do you know the gasholder capacity now?—It is 64,000 cubic feet; and the maximum day's output has been 56,000 cubic feet. In giving the £700 per million, when we reach 20 millions, I have allowed for the extension of the works.

And the mains outside?—Not the mains outside.

Further examined by Mr. FREEMAN: The profits shown for last year were £1009. All the Manager's wages were charged in one item; but the Manager was a general utility man on the works, whose time was largely occupied with repairs to mains, laying pipes outside, &c.

Mr. JONES: Does he direct, as well as supervise, the extension of the mains and additional services? And would he also direct and supervise the repairs of the works, as well as supervise the manufacture of gas?

Witness: Yes. My point is that he takes part in the repairs. If he did not work with his own hands, the cost of repairs would be larger. Under these circumstances, I have added one-third of his salary to the cost of repairs and maintenance. The cost of repairs of works, mains, and services in 1897 was 5·98d., in 1898 3·12d., in 1899 2·78d. per 1000 cubic feet sold. To these figures I add one-third of the Manager's salary; the average thus obtained being 4·19d, which I regard as sufficient for keeping the works in a complete and efficient state. I, however, take 5d. per 1000 cubic feet as being a sum sufficient for repairs, maintenance, and renewals of works, mains, and meters, and from this deduct the actual expenditure of 3·78d.—leaving 1·22d. per 1000 cubic feet, which, on 10,603,000 cubic feet, equals £54. This reduces the £1009 to £955.

The next question you have to consider is what probability there is that this £955 is a figure likely to be continued to be received. Have you made yourself thoroughly acquainted with the circumstances of the town?—Yes.

Do you find there is a margin of increase?—Certainly. There appear to be 700 or more houses, of which some 400 have gas. I was greatly impressed by the town itself; and if it does not improve, it ought to. It is a very charming place, and it has the appearance of great brightness and prosperity about it. Having regard to these facts, I have taken 26¾ years' purchase, which gives £25,467. I knew the Company is a non-statutory one; but I do not regard this fact as very important because it is without limitation as to its dividends, and practically safe in its position. Excepting incorporation, and the sense of security that this brings, I do not know what the difference between a statutory and a non-statutory company is. The capital of the Company is excellently represented by works; and the undertaking is well managed and increasing. To the £25,467, I have added £122; being 26¾ years' purchase of the ground rent of £4 11s. 4d., and £1988 the value of surplus works—making £27,577.

As to the surplus works. Have you formed a calculation regarding their value?—Yes. I would have preferred that Mr. Newbigging should have been the first witness, because he has valued the works much more thoroughly than I have done. He has made a valuation; and I have checked it very carefully. I agree with him except in one matter—he leaves a reserve of 20 per cent. of retorts; and I say 15 per cent. is sufficient.

The UMPIRE: You mean by that, reserve for contingencies.

Witness: Yes.

Witness (continuing) said he put the excess in the coal-store at £338, the retort-house £734, the retorts £246, the purifiers £271, the gasholders £303, and the site £300—a total of £2192. But for a deficiency in exhausters and scrubbers, he allowed £130 and £74 respectively; leaving the value of the excess works at £1988. There was also excess capacity in the condensers and in the station meter, worth together about £50. To the £27,577, he added 10 per cent. on account of the sale being compulsory—raising the total to £30,335, which, less £200, the cost of purchasing the land the Company at present leased, became £30,135—his final figure.

Mr. JONES: You have made these valuations for the excess works on the principle that if you had to provide these or similar works they would cost £2100.

Witness: Yes.

Cross-examined by Mr. BALFOUR BROWNE: With regard to the growth of the undertaking, especially in the years 1898 and 1899, the only explanation you gave was that it might be accounted for by the prepayment meters?

Witness: Yes, or improving prosperity of the town itself. The increase attributable to the prepayment consumers was 3·2 per cent. in 1899 over 1898. The make of gas per ton in 1899 was 9144 cubic feet, and in 1898 8717 feet; so that there was an increase in 1899 of 427 feet per ton. The increased sale of gas, instead of being 427 feet was 663 feet per ton.

Is that not rather an extraordinary result?—It is a satisfactory result. It was due very likely, he added, to increased attention to service pipes and meters. The increased make was 850,500 cubic feet; but the increased sale was 1,115,317 feet. If there had been equally good management in previous years, there should have been a better proportion between make and sale.

The cost of repairs of mains, which you say accounts for this, has gone steadily down. In 1897, £100 11s. 1d. was the outlay on repairs to mains and services. In 1898 it was £33 7s. 2d., in 1899 £20 0s. 7d.?—Yes.

So that this will not account for it?—The apparent money expenditure does not.

Now, notwithstanding the greater quantity of gas made and sold in 1899, are you aware that the leakage has decreased in an extraordinary way?—Necessarily.

In 1898 it was 1,157,513 cubic feet, and in 1899 820,776 feet?—Yes.

So that, in the account year, they have the great advantage against us, first of the enormous increase of sale as compared with make, and secondly, of the great decrease of leakage or unaccounted-for gas?—The one is exactly the same as the other. What is added on to sale as compared with make is deducted from unaccounted-for gas.

The difference is 336,000 cubic feet, or, in round figures, about 30 per cent. less leakage in 1899 than 1898?—7 per cent. is quite enough.

How do you account for the fact that in this year it goes down when they are spending less money?—It may be there was an excessive quantity burnt in the public lamps. It may be the meters were not attended to with sufficient regularity. I cannot give you a definite reply.

I find the average leakage for ten years was 11·55 per cent.?—Yes.

Cross-examination continued: The reserve fund was in the business, not accumulated separately. If the maximum make was greater than 56,000 cubic feet, the gasholder capacity was not so redundant as he had said. In his item of £300 for the excess value of the land not utilized, he had put the value of the land at 5s. a yard, which he thought fair. Nearly half the land was unoccupied.

Mr. FREEMAN said the figure mentioned by witness was the price paid for the land.

Friday, Nov. 17.

Mr. *Hett* (re-called) said, with reference to the value of 5s. a yard put on the surplus land by Mr. Woodall, the Company had recently bought a small plot of 220 yards for £52 10s., which practically worked out to the same price. Of his own knowledge, he held that the land was worth 5s. a yard.

Mr. *George Jack*, examined by Mr. LLOYD, said he became Manager to the Company in 1884, since when all the works had been altered or renewed, with the exception of the small gasholder, the scrubber, and the station meter. By the works, he meant the plant, not the buildings. The station meter was thoroughly overhauled in 1898. A new retort-house was built in May, 1897, containing four beds of six retorts each. The retort-house was large enough for two more beds. New condensers were erected in 1898, also a purifier-house, four purifiers, and a centre-valve, all with 8-inch mains, in view of future extensions. The new coal-store was extended in 1898 to a capacity of 700 tons. The plant was equal to twice the present demand. The capacity of the large gasholder was 48,000 cubic feet; and that of the smaller one, 16,000 feet. The heaviest day's make was 63,500 cubic feet, in January last, in very foggy weather.

By Mr. JONES: He could not say what gas was sent out that day.

By the UMPIRE: The station meters were taken at noon, but not the stock of gas.

By Mr. JONES: The gas was obtained by squeezing the retorts.

Mr. STEVENSON: But it went through the gasholders.

By Mr. JONES: Twelve retorts made the 63,500 cubic feet, so that they were equal, when pressed, to nearly 5300 feet each.

Further examined by Mr. LLOYD: The week when the heaviest consumption occurred was from Jan. 2 to Jan. 8; the figures ranging from 50,700 to 63,500 cubic feet, and the total being 395,000 feet. The Company commenced the penny-in-the-slot business three or four years ago. Since October, 1898, he had fixed 73 prepayment meters, and fitted up 42 houses. On June 30 last, the Company had 329 ordinary meters and 87 prepayment meters; and they supplied 84 public lamps. The make and sale of gas increased very much in the year to June last; the increase being 1,115,317 cubic feet. The gas was of 18 or 19 candle power, and was generally acknowledged to be very good. There had been no complaints. The increase in the consumption for the three months ending September last, as against the same three months of 1898, was between 94,000 and 95,000 cubic feet. Witness was Working Manager—a general utility man—and he and his men had repaired mains, fixed meters, attended to escapes, and done the ordinary repairs. He himself took part in all the work, except stoking and filling coke. The meters were in very good condition. The mains, of which he handed in a list, were in a similar state.

Cross-examined by Mr. BALFOUR BROWNE: Not one of the 73 people who took penny-in-the-slot meters had been consumers before. He had no absolute figures of the increase due to the use of prepayment meters. Out of 9967 yards of main, over 2000 yards were new.

By Mr. JONES: Besides attending to the manufacture of gas, he laid new mains, fixed additional services, and saw to the repairs.

By the UMPIRE: To get the extra gas when the consumption rose to 63,500 cubic feet in one day, he put more coal in the retorts, drawing them at rather less than the usual intervals, so that he had nearly five charges in the 24 hours. He had made almost 34,000 cubic feet a day from one bed of retorts in six-hour charges.

Mr. *Samuel Wood*, of Messrs. Lass, Wood, and Drew, presented a mass of tables relating to the Company's accounts, which had been agreed with the Accountants' on the other side, except as regards the apportionment of the Manager's salary and of the workmen's wages as between capital and revenue. Some apportionment of the Manager's salary should be made; and with the assistance of the Manager, he had apportioned the workmen's wages. He had charged nothing for depreciation of meters; but he had made an allowance for the actual repairs and renewals.

Cross-examined: Certain moneys had been transferred from revenue account to reserve. All the reserve fund was in the works of the Company. The repairs of works, mains, and services in 1897 together came to 5·98d. per 1000 cubic feet of gas sold; but in the next year the figure dropped to 3·12d.; and in 1899 to 2·78d. So that, comparing the first with the last, there was a startling difference. He did not place to capital account the portion of the Manager's salary attributable to the laying of new mains; but he did apportion the labour expenditure as between capital and revenue. The total wages for 1899 came to £386 6s., of which he put £17 15s. 6d. to capital. This was done on information derived from the Manager. He allowed 10 per cent. for depreciation of stoves, but nothing for depreciation of meters. On being pressed as to why, having allowed depreciation in one case he did not allow it in the other, he said really he did not agree with allowing it as regards the stoves.

By Mr. JONES: In regard to depreciation of meters, they already had experience for over forty or fifty years, but with stoves their experience extended only over eight or ten years; so that companies undertaking to hire them would wish to be on the right side. The statement of capital expenditure did not include the whole amount chargeable to capital, as other payments on capital account had been made from revenue.

Mr. *Thomas Newbigging* said the site of the Company's works was upon a canal, and at the lowest part of the district. The site was most convenient, both for the delivery of raw material and for the despatch of residuals. The works were in the best of order, and had recently been renewed practically throughout. The works were generally much in excess of present requirements, and there was space upon the site for further extensions. The retort-house, though amply large enough for six benches, contained at present only four benches of six retorts. Each retort was capable of producing at least 5000 cubic feet a day, or in all 120,000 cubic feet. The works being small, he allowed a reserve of 20 per cent., instead of the usual 15 per cent., leaving the available productive power at 96,000 cubic feet daily, which was an excess of 70 per cent. over the average day's make, which, reckoned on the maximum week's make, was 56,430 cubic feet. Witness then gave details of the other parts of the works; stating that there was excess capacity also in the coal-store, the purifiers, the gasholders, and the site; while there were deficiencies in the exhauster and scrubber. The works contained the best and most efficient plant for producing gas economically and of a high standard of purity. The distributing plant, consisting of 3¾ miles of mains, varying from 8 inches in diameter downwards, and the service-pipes, was in good condition, he should say, judging by the leakage and the low pressure of 25-10ths that was required. There had been a great increase in the consumption; the growth in the last five years having been 31·71 per cent., or 5¾ per cent. per annum compound. In the last year the increase was 11¾ per cent., which was largely due to the introduction of prepayment meters. He thought the position of the Company would be maintained for a considerable time, having regard to the prepayment meters and the fact that 50 per cent. of the population were not at present supplied. With a little exertion the Local Authority could, by means of prepayment meters, make nearly the whole of the population consumers. The capital expended to June last, he put at £10,119 5s. 1d., which was exceeded by the structural value of the works and plant, which, with the chattels, Manager's house, &c., he estimated at £10,950. In former years, therefore, he thought there must have been expenditure of revenue on capital account; but this structural value, of course, did not represent the commercial value of the undertaking as a profit-earning and dividend-yielding concern. In his valuation, he had taken the balance of profit for the year to June last, as shown by the accountants—viz., £1008 18s. 4d.—to which he added the rent of the leasehold land £4 11s. 4d. (deducting subsequently the cost of purchasing this land), which made £1013 9s. 8d. He held that the amount shown to have been expended in repairs for the year was not a sufficient sum. It should be such a figure as would not only keep the works in repair, but reproduce them; and this figure he put at 5·25d. per 1000 cubic feet, instead of the actual expenditure which, including one-third of the Manager's wages, only amounted to 4·02d. per 1000 cubic feet. The difference was 1·23d. per 1000 feet; and applying this to the sale of 10,603,200 cubic feet, equalled £54 6s. 10d. This reduced the £1013 9s. 8d. to £959 2s. 10d., which was his figure of the maintainable profit. If this were a statutory company, he should value it at 40 years' purchase, which would give a multiplier of 28·57; but being a non-statutory concern, he thought the multiplier should be 26⅔—the variation between these two figures, representing the extreme difference in the value of the two kinds of companies supplying. This figure gave £25,577, to which he added £1911 (the difference between £2115 the value of the excess capacity and £204 the extent to which the works were deficient), making £27,488, or, *plus* 10 per cent. allowance for compulsory sale, £30,236. From this he deducted the cost of purchasing the leasehold portion of the site, £200, which left his final figure of £30,036. Beyond this, the stock-in-trade would have to be valued on the date of transfer. He had not charged anything for the depreciation of meters; it was not allowed under the Act. The justification for charging depreciation upon stoves was that the Company might have them thrown on their hands, as the users' taste varied.

Cross-examined: He assumed that one of the gasholders was 65 feet by 16 feet, and the other 42 feet by 12 feet. If these dimensions were too large, then the capacity was not so great as he calculated. In reckoning the increase in consumption, he usually took five years. He agreed that, if he had gone back further, he would have found the consumption decreased from 1892 to 1895. It was not worth while going back more than five years, however, because of the impetus given to gas managers recently by the introduction of the electric light.

The UMPIRE said witness had better go and ask their friends in Horseferry Road about that.

Witness replied that that was the only exception in the country.

In further cross-examination, it was put to witness that the capacity of the two holders was only 60,000 cubic feet; but he maintained that it was 65,000 feet. His scheme was to value the works not as they were—partly leasehold and partly freehold—but as all being freehold. He did not admit that he thereby mulcted the Council of £497, claiming 26¾ years' purchase of £4 11s. 4d (£122) and £375 for excess in land.

Mr. JONES: Are you allowing for the fact that it is against the vendors to receive £122 and allow £200?

Mr. BALFOUR BROWNE: I know; but the net result is a loss of £300.

Witness: I have only taken £122 and added it to the bare value of the land. On the other hand, I admit that they have got £200 taken off.

In further cross-examination, witness said the whole of the excess works would be required within twelve years; but he had not discounted the sum allowed for them on that account.

Mr. FREEMAN: Because this is structural value.

Witness: I would have discounted it had I been reckoning the profits to be derived from these gas-works.

Cross-examination resumed: He agreed that he applied the 10 per cent. allowance to this item, thus adding £190 to the claim. He put the difference in the value between a statutory and a non-statutory company at 2 years' purchase. Twenty years ago, the relative figures were 16⅔ and 20 years, and then 20 and 25 years.

Mr. BALFOUR BROWNE: If that is so, why should there be two years difference to-day and four years twenty years ago?

Witness: Well, we know Parliament protects a non-statutory company. There were several cases of competition allowed formerly.

Would you tell me one single instance where either Parliament or the Board of Trade has allowed competition between a local authority and a company?—I cannot remember one; but we all felt that a non-statutory company was nothing like as safe as it is to-day.

Re-examined: The difference between a non-statutory and a statutory company was sentimental rather than actual or practical.

Mr. *Corbet Woodall* was next re-called and further cross-examined. He said he had made a correction of his figures of the excess works on the basis that the maximum make of gas was 60,000 cubic feet. The effect of this was to reduce his total figure of £1988 to £1478, which diminished his final figure to £29,573.

Mr. JONES inquired why witness took the maximum day. He did not see where the gasholder came in, if every part of the plant was to be equal to the maximum day's make.

Witness said he took the maximum day's output, because that was generally accepted as being the standard.

Do you think it is any safer guide than taking the average of the maximum week?—I do not think I do; but I do not care, especially when valuing for the vendor, to go below the standard which has been established by so many precedents.

In reply to Mr. STEVENSON, witness agreed that if the average for a week was 50,000 cubic feet a day, and the purifying plant was only capable of passing this quantity, it would only pass that amount when the quantity wanted might be, say, 60,000 feet, although next day the demand might be for only 40,000 feet.

Mr. *David Briggs*, auctioneer, said the value of the site of the gas-works was an excellent one for business purposes and worth, in fee simple, 5s. a yard.

In cross-examination, he admitted that he had never sold land in Brigg at 5s. a yard.

This closed the case for the Company.

Mr. BALFOUR BROWNE, in opening the case for the Council, said he did not question that the works were in good condition, and in an excellent locality; nor that the Company were supplying good gas. But he did question the estimate that the abnormal increase shown in the last year—the account year—was going to be maintained. Brigg was rather a sleepy hollow, and did not advance, as many places did, by leaps and bounds. They knew that in the last fifteen years only 43 houses had been built. Considering that it had taken the town from 1836 till now to get the trade to 58,000 cubic feet a day, it was rather sanguine to conclude that the large increase of the last year was going to continue. The accounts of the past year were very remarkable; everything on the asset side having gone up, while everything on the expenditure side had gone down. The cost of purifying, which was 1d. per 1000 cubic feet in 1897, became 0·54d. in 1899; the cost of repair of works sank from 3·37d. in 1897 to 2·32d. in 1899; and the leakage similarly diminished from 10 or 11 per cent. to 6 per cent. At the same time the consumption rose most remarkably. All this threw some doubts on the

accounts of that year as being perfectly satisfactory. They had to discover what would be the probable income in the future, and to judge of this not only by the figures of the present, but also of past years. In the figure of £1008 18s. 4d., with which both sides started, was an item of £7 10s. received from the Council for pumping; but surely this ought not to be capitalized as if it was ordinary gas revenue and multiplied by 26⅔, seeing that it could be terminated on reasonable notice being given. Counsel went on to enumerate a number of small items in regard to which deductions from the profits, as given for 1899, would have to be made; among them being increased cost of purifying, a sinking fund in respect of the works on the leasehold land, further allowances for maintenance and depreciation, &c. The total of these figures was £204 2s., which reduced the £1008 odd to £804 16s. 4d.

The UMPIRE: Suppose they did not make sufficient to pay 9 per cent., could they raise their price at once?

Mr. BALFOUR BROWNE: Well, I do not say there is anything to prevent them; but I think the price is high enough.

Mr. STEVENSON: There is no doubt such a course would reduce the increase, if not the consumption itself.

The UMPIRE: At any rate, you contend it would be bad policy for the Company?

Mr. BALFOUR BROWNE: Yes. Continuing, he said the important question was what multiplier they were to apply to the net maintainable profit. Mr. Newbigging said there was five years' difference twenty years ago between the value of a statutory and a non-statutory company; and this was because there was less certain security for the non-statutory than for the statutory company. Mr. Newbigging now held that, looking at the action of Parliament latterly, there was almost as good security for the one as for the other. Counsel entirely differed; his experience being that Parliament was not so careful of vested interests and rights as it used to be. He knew, of recent years, of not a single non-statutory company who had come to Parliament to be turned into a statutory company who had succeeded without getting a purchase c'ause inserted in their Act at the instance of the local authority. On the other hand, in no instance of a statutory company had the clause been inserted, as far as he knew, except in the extraordinary case of the Reigate and Redhill Companies. The question of security also entered into the matter; and here again he held that the statutory company was in a better position than the non-statutory company. Having regard to these circumstances, the multiplier used was 22. In conclusion, he dealt with the question of excess works; stating that there was not a great difference between the Council's figures and those of Mr. Woodall, the only question being whether the value of the works should be given over as cash, or whether it should be treated as deferred and therefore discounted. He held that the latter course should be adopted; and as the Company's witnesses said the excess works would be used up in fourteen years, the suggestion was that the value should be discounted for seven years.

Mr. *G. S. Sowter*, the Clerk to the Council, said, with regard to growth, the town was practically stationary. The present rateable value was £10,404, as against £8940 in 1892; the increase being due chiefly to re-assessments, not to the building of new property. The present population he estimated at from 3100 to 3150; the increase of recent years having been very slight. Of the 666 houses in the town, 466 were under £10 per annum rateable value.

In cross-examination, witness agreed that no doubt the reason the Council wished to purchase the gas-works was that the investment would be remunerative.

Saturday, Nov. 18.

Mr. *W. A. Valon* agreed that the works were in a convenient position for the manufacture and distribution of gas. He said the district of supply was not large—460 acres—and it did not seem to be a very progressive place. The structural value of the Company's works, plant, &c., he put at £9115. The total value of the excess works was £1531. There was not a startling difference between this and Mr. Woodall's last figure, because they both took the same figure as the maximum day's make. The two chief points as to which they differed were regarding the gasholder capacity and the land. It was not right to treat the value of the excess works as if they could immediately be used. The retorts would not, on the present rate of progression of the Company, be all utilized for 22 years; and he therefore deferred the value on that basis. If the Local Authority were to take over the works at the present value, they would be at the loss of the interest of these items of excess capacity until the works were fully in operation. Witness's figures of excess value were: Retort-house and retorts, £850; coal-store, £350; purifiers, purifier-house, and lime shed, £200; land, £131—a total of £1531, the deferred value of which was £1102. On the other hand, the Company's works were deficient as follows: Condensers, £20; scrubber, £150; gas-engine, engine-house, exhauster, and connections, £220—a total of £390; leaving a balance of £712. The district was fairly mained. The Company had 329 ordinary, and 87 prepayment meters, the total value of which was £655 5s. In his valuation, he started with the figure of profit for the year ending June last, given by the Accountants, £1008 18s. 4d., from which he made certain deductions to arrive at the net maintainable profit. The Company received from the Council £7 10s. per annum for pumping water; but as this was on a six months' agreement, he deducted the proportion which he estimated would be profit—viz., £2 10s. His next deduction was £44 14s. 8d., the cost of 75 tons of additional coal, at 11s. 11·15d. per ton. The accounts showed that there had been a decrease in the leakage; the figure for 1899 being only 6·93 per cent., while that for the ten preceding years was 11·55 per cent. At the same time, there was a large increase in the make per 1000 cubic feet. The gross income in 1898 was £2225; and in 1899, £2463 12s. 3d.—an increase of £238 12s. 3d., or 10·72 per cent. The coal and working expenses for 1898 were £1339 15s. 7d.; and for 1899, £1454 13s. 11d.—an increase of £114 18s. 4d, or 8·58 per cent., against 10·72 per cent. increase in the gross income. The gross profit in 1898 was £885 4s. 5d.; in 1899, £1008 18s. 4d.—an increase of £123 13s. 11d., or 14 per cent. These figures revealed discrepancies as between revenue and expenditure. Coal alone cost 11s. 11·15d. per ton in 1899, as against 10s. 9·23d. in 1898—an increase of 1s. 1·92d. per ton, or 10·77 per cent. Eliminating this extra charge for coal, the increase in the expenditure, instead of being £114 18s. 4d., or 8·58 per cent., would be only £39 15s. 0d., or 2·96 per cent.; while the revenue had increased by 10·72 per cent. A comparison of these percentages showed, he thought, a want of harmony; and it was these things which called his attention to the large make of gas per ton, the largely increased sale per ton, and the low leakage for 1899—things which made it necessary to reconstruct the working expenses. The coal carbonized in 1898 was returned as 1262 tons, and in 1899 as 1296 tons—an increase of 34 tons only, or 2·69 per cent. The gas made increased from 11,000,400 cubic feet in 1898 to 11,850,900 feet, or by 850,500 feet, or 7·73 per cent. Looking at these figures, 2·69 and 7·73 per cent. appeared very much of an anomaly. With equally good working, there ought to have been harmony between the results. The quantity of gas sold in 1898 was 9,487,887 cubic feet; and in 1899, 10,603,204 feet—an increase of 1,115,317 feet, or 11·75 per cent. Thus, while the make increased 7·73 per cent., the sale went up 11·75 per cent.; and the unaccounted-for gas dropped from 1,157,513 cubic feet in 1898 to 820,776 cubic feet—the difference being 336,737 cubic feet, or 29·09 per cent. The unaccounted-for gas in the ten years ending June, 1898, was 11·85 per cent. per annum; while in 1899 it was stated to be only 6·53 per cent. This was probably accounted for by the meter being defective; and it might also be that the stock of coal in store was over-estimated at the end of the year. To correct this discrepancy, he suggested that the leakage should be taken, as in previous years, at 11·55 per cent. on the make of 1899, which would increase the make for that year to 12,470,462 cubic feet—an addition of 619,562 cubic feet. This would bring the unaccounted-for gas up to 1,440,338 cubic feet, which was nearer what one would have supposed it to be in comparison with former years, and apparently pointed to the meter recording 4·96 per cent. less than the actual quantity it passed. Again, the yield of gas per ton during the same ten years averaged 8355 cubic feet. Allowing for a yield of 9100 cubic feet in 1899 (equivalent to nearly 10 per cent. increase, owing to the new retorts being in use), the quantity of coal carbonized to produce the 12,470,462 cubic feet just mentioned would be about 1371 tons, or 75 tons more than the quantity shown in the accounts, the value of which would be £44 14s. 8d. This sum should therefore be added to the working expenses. With regard to the possibility of the cost being over-estimated, he said the stock at June 30 in the four years 1896 to 1899 was respectively 212, 60, 220, and 337 tons. The stock at June, 1899, was 117 tons more than at June, 1898, and would be enough to last the Company, without adding to it, for more than three months. This would go in support of the suggestion that at June, 1899, the quantity was over-estimated. Evidently in 1894 a similar mistake was made; the make that year being at the rate of 9167 cubic feet per ton, while in the following year it was only 7819 cubic feet. The mean of these figures would be 8493 cubic feet, which approximated to those for the preceding and subsequent years.

The UMPIRE said he placed no reliance on these figures—the meter being out of order, and the stock of gas never having been taken.

Mr. BALFOUR BROWNE (to witness): You believe they used 75 tons more coal to produce the gas in 1899 than the statements show?

Witness: I am certain of it.

In further examination, witness said: The amount charged for purifying in the account year was too small. The allowance in 1899 for purification was 0·54d. per 1000 cubic feet sold, as against 0·85d. in 1898 and 0·97d. in 1897. The accounts showed that this was caused by the lesser quantity of lime purchased in 1899, as against both 1898 and 1897; the figures being £25 2s. 6d. in 1897, £22 6s. in 1898, and £12 4s. 7d. in 1899. An average of the lime used and labour for the three years gave 0·78d., or ¾d.—a reasonable figure. This discrepancy, again, might be due to stocks at the commencement or end of the year; but it was clear that a greater quantity of gas in 1899 could not have been purified with less lime and labour than in previous years. Adjusting the figures on this basis, gave a further deduction of £10 12s. The next deduction was £3 19s. 4d., being the sinking fund instalment which, invested annually at 3 per cent., would reproduce £1500, the value of the works on leasehold land. With reference to depreciation, witness said usually prepayment fittings were carried to a suspense account; and a part of the extra amount collected for the gas sold through prepayment meters was set aside to meet part of the expenditure on the wear and tear of fittings. In this case, all the expenditure had been charged to capital; all the receipts being carried to revenue. He had taken eight years as the life of the fittings, and therefore allowed 12½ per cent. on them, or £11 6s. 11d. On the stoves, which cost £136 14s., he allowed 10 per cent. (£13 13s. 5d.), to which he added 18s. 7d. for repairs, making £14 12s. 0d. From this, however, he subtracted £10 13s. 11d., the amount included in the accounts, leaving a net deduction to be made from the profits of the year of £3 18s. 1d. The depreciation on meters he put at 5 per cent., which gave £32 15s., or, less the amount included in the accounts for repairs, &c., £28 19s. 6d. Regarding the cost of repairs and maintenance of works, mains, &c., his experience of a number of small works showed him that 5d. per 1000 cubic feet sold was the usual figure. He accepted this here, and therefore added 2·22d. to the actual figure of 2·78d., which, applied to 10,603,000 cubic feet, equalled £98 1s. 6d., as against the figure advanced by the valuers on the other side of £54 6s. 10d. He made no allowance for Manager's time or manual labour, because it was not possible for a Manager to do manual work to any extent. These deductions made a total of £204 2s., which reduced the £1008 18s. 4d. to £804 16s. 4d. This was his estimate of the maintainable profit. He capitalized this amount at 22·22 years' purchase—that was, on the 4½ per cent. table. His reason for this was that he did not think, in a town like Brigg, anybody could invest his money at less than 4½ per cent. in a concern of this kind. Witness went on to give a number of gas companies in which investments had recently been made to return about 4½ per cent. Applying the 22·22 to the £804 16s. 4d., gave £17,883 0s. 6d., to which he added £2 10s. one year's estimated profit of pumping water for the Council, and £712 being the net amount of excess apparatus after deducting deficiencies—making a total of £18,597 10s. 6d.

Cross-examined by Mr. FREEMAN: The £7 10s. was not received for supplying gas to pump water, though he agreed that the Company used gas in the pumping. The Company sold 600 cubic feet more gas per ton of coal carbonized in 1899 than in 1898.

Mr. FREEMAN: Your sales have gone up in proportion as your leakage diminished?

Witness: Your sales have gone up in the past year.

You have saved more in leakage; therefore you have more sale?—Yes.

Mr. FREEMAN: They are interchangeable terms.

Mr. STEVENSON: Oh, no.

Mr. FREEMAN (to witness): Is it not a fact that if I save 1000 cubic feet on leakage, I have that available for sale?

Witness: Yes; if you do save it.

Therefore the whole thing comes to this: How are you going to account for the saving on the leakage?—It is not for me, it is for you to account for it.

I suggest that if we have a meter which does not register (which can be set right), and if we have our works in perfect order, we can save that?—Leakage has to do with another matter altogether—the soundness of the mains.

Does not leakage depend entirely on the registration of the station meter?—I have shown that your meter was out of order, and did not register the proper quantity made; and therefore I have added a proper quantity to bring it up to the amount that was made.

Is it not very much simpler to leave out the question of what was made, and look solely to the quantity sold?—But you say they sold so much more by carbonizing a less quantity of coal. I say you have secured that by carbonizing 75 tons more than you show.

Your point being that, if they have sold more gas in one year than they did in another, they must have employed proportionately more coal. I suggest that if, instead of using more coal they have better machinery, this would account for it?—I have given credit for better machinery.

In further cross-examination, witness said the station meter was repaired in August, 1898; and therefore did not register for all 1899. The make of 8100 cubic feet per ton of coal carbonized, for 1899, was not sufficient. Neither the make nor sale of gas per ton of coal in 1899 was excessive; but this did not alter his argument.

Mr. STEVENSON: The sales are not so bad as they appear, because there was an unusually large quantity of gas used on the works.

Cross-examination resumed: With regard to the purification, if new purifiers were put up in 1899, this would partly account for the drop in the figures for that year under purification.

Mr. FREEMAN: The prepayment fittings are maintained out of revenue, are they not?

Witness: They have not been maintained out of revenue.

Because they have only been in a few months?—I say you must.

But if you maintain your fittings out of revenue, surely this is a perfectly proper thing to be done?—They have not been so maintained.

Do you know they are guaranteed by the makers for five years?—All meters are guaranteed.

Mr. JONES: I never heard of prepayment fittings being guaranteed.

Further cross-examined: There was no arbitrary figure which would represent the difference between the value of a statutory and of a non-statutory company. Questioned as to the difference between the two, he said a statutory company, after the dividend had been earned, had no further interest in the concern—it belonged to the consumers. With non-statutory companies this was not so—everything belonged to the company. In a purchase of a statutory company, they simply applied a multiplier to its statutory dividend, and handed the whole concern over—stocks, reserve fund, undivided balances, insurance, &c. But with a non-statutory company, after the multiplier was applied, everything—undivided balance, stores, &c.—was reserved to it. Therefore, in multiplying in the present case by 22·22, they had to add really another two or three years' purchase for the other things. It was impossible to compare a statutory and non-statutory company unless the whole of the circumstances were known. He could not say what multiplier he should have applied here had this been a statutory company, unless he knew whether it was under the sliding-scale or maximum price law. In arriving at his figure of £131 for surplus land, he first ignored the leasehold land, because obviously none of that could be regarded as excessive. The freehold land was about three-fifths of an acre. If they were to build the works, they would occupy about half an acre; but, as a fact, he had treated one-third of the freehold area as surplus, and reckoned it at 2s. 6d. a yard. The deferring in connection with the excess values was done by taking the average increase in consumption, and on that basis calculating what portion of the excess works would be required from year to year. He only had regard to the structural value. He did not forget the allowance for compulsory sale; but he did not add it, because it was his invariable practice not to do so unless the Act directed the contrary.

By Mr. JONES: After the works, as in this case, had been for eighteen months under the general direction of a competent consulting engineer, he should not be surprised to learn that they obtained 8181 cubic feet of gas per ton of coal carbonized, in place of smaller quantities previously. In fact, he would not be surprised to find the make 8700 or 8800 cubic feet; but that did not go to the root of his argument about the 75 tons of coal extra.

Mr. *Charles Hunt* said, in valuing the undertaking, he put the net profit from the pumping at £5, which reduced the £1008 18s. 4d. to £1003 18s. 4d. He then made a number of deductions in adjustment of the accounts. The sum of 2·86d. per 1000 cubic feet of gas sold—representing the expenditure on repair and renewal of meters, services, &c.—was insufficent; it should be 5½d. So that a further sum of 2·64d. per 1000 cubic feet sold would have to be allowed, which came to £116. Then he put depreciation of prepayment fittings at 10 per cent., or £9 1s. 6d. In regard to the temporary improvement in the quantity of gas sold in 1899, he assumed the improvement was largely attributable to the new retorts. Being all new, they gave better carbonizing results; but the improvement could not continue, because the retorts would grow older. He had therefore treated half the improvement as being permanent, which gave the figure of £29 15s. Then the purification 0·54d. per 1000 cubic feet in 1899, was much less than in previous years, and was low for lime purification. The figure should be 0·75d.; and the difference between this figure and 0·54d. meant a further deduction of £9 5s. The fund for the redemption of the works on leasehold land he put at £5 10s. 10d. These figures gave a total deduction of £170 5s., and left the maintainable profit at £833 13s. 4d. To this he applied the multiplier of 22·22, which, in his opinion, was a high figure for a non-statutory Company, and produced £18,524 2s. His figures of the value of the excess works were: Retorts, £383; retort-house, £480; coal store, £292; purifier, £155; land, £131—a total value of £1387. The deferred value was £949. The deficiencies he estimated at £410; leaving a balance of £539, which with £5—one year's purchase of the profit on pumping water—he added to the £18,524 2s., making his final total of £19,068 2s.

In the course of his cross-examination (which was very brief), witness said he should make a difference of five years in the purchase of a statutory and non-statutory company, supposing the two were similar.

By Mr. JONES: Having regard to the illuminating power of the gas, which was very good, he should be satisfied with the make in 1899 of 8181 cubic feet per ton of coal carbonized.

This closed the evidence.

Mr. BALFOUR BROWNE, on behalf of the Council, asked the Umpire not to treat the income from the pumping in the same way as the sale of gas—as a permanent asset of the Company—seeing that it could be terminated on reasonable notice being given. In this particular account year, there were some curious discrepancies as compared with the year before. Certain of them might be accounted for by the new works; but they must remember that the benefit of the new works was not felt solely in 1899, because most were completed and in use during the previous year. How could they account for the extraordinary reduction in the leakage? If they had shown that over a series of years the leakage was 11 per cent., and their mains in bad repair had been put in order, no question would have been raised. But that was not the case; and it was not suggested. Probably Mr. Valon was right—to some extent at least—in thinking there was an over-estimate of the quantity of coal in store; and if more had been used than was supposed, that also would partly explain the matter. It was obvious that the figure of £1008 which was given as the profit for 1899, was too large, and there ought to be certain deductions in adjustment of it. But it was for the Umpire to say what the amount of the deductions should be. He certainly thought that the Council's valuers were right, in principle at least, in making the deductions they had done. Having made these deductions, they obtained the net maintainable profit, which, however, he did not think was likely to be increased. As to the multiplier, he suggested that no one in Brigg would be content with less than 4½ per cent., which gave the figure used, of 22·22 years' purchase. He did not bother about the excess works, because the witnesses were nearly agreed in regard to them. In conclusion, he discussed the question of discounting the value of the excess works, contending that the valuers for the Council were justified, and acted properly in doing so.

Mr. FREEMAN, in reply, said that there was not in this case the enormous and egregious differences which sometimes were found to exist between the two sides in arbitration cases. With regard to the large increase in 1899 in the production of gas per ton of coal carbonized, he reviewed the evidence on both sides—suggesting that the increase was amply accounted for by the retorts being new. He therefore urged that the whole of Mr. Hunt's figure of £29 15s. should be excluded, because it was based on purely imaginary criticism of accounts, which he held were perfectly consistent with the facts. He also absolutely objected to the deduction for the redemption fund for the works on the leasehold site, seeing that before the Company went to Parliament they obtained the option to purchase the land, and but for the Council wishing to acquire the works, the Company would have carried out the purchase as it would be now carried out by the Council. Therefore they were entitled to consider the operation as effected, and thus sweep away this question of the redemption fund. As to the multiplier, the whole thing depended on the difference in the security of a non-statutory as compared with a statutory company. Parliament was as tender in its care of one as it was of the other, and there was hardly an instance in which there had been a conflict between a non-statutory company and a local authority, with the result that the latter had stood in the company's way. The difference was merely imaginary. A local authority, it was true, had power to refuse permission to the gas company to open the streets, &c., but one knew there was no reason why they should do so. He asked the Umpire to say that the larger figure suggested was justified by experience. The proposal to defer the excess value of the works, he held to be wrong. The Company might very well have claimed for the future profit to be earned by these works; and in that case the argument would be good that, as they were not going to get all the benefit at once, it must be calculated as accruing from time to time. But there was no such claim. The money had been actually paid; and as only the structural value was being claimed, the Council ought at least to pay the price the Company paid for the works, and thus put themselves in precisely the same position as the Company. Otherwise the Company would be mulcted—without remuneration at all—of profits which they would have made from the works. As to the 10 per cent. allowance for the sale being compulsory—and which neither of the Council's valuers included—he thought it could not be seriously argued that it was not to be given. The Act deliberately said the Company were to be compensated under the Lands Clauses Act. It was true that in this latter Act, the 10 per cent. was not specifically mentioned; but no one would argue for a moment—after the 40 years that the Act had been in operation—that it was not the absolute practice, when dealing with a compulsory transfer, to allow it, unless the Private Act expressly forbade it, which was not the case here. Therefore it should be allowed.

The proceedings then terminated; the Umpire reserving his award.

THE ACQUISITION OF THE LEIGH (ESSEX) GAS-WORKS BY THE DISTRICT COUNCIL.

The Arbitrators' Award.

It may be remembered that one of the Acts of the past general session was obtained by the Leigh (Essex) District Council to enable them to purchase the local gas-works—carried on by Messrs. S. & H. S. While as the Leigh-on-Sea Gas Company—at a price to be determined by Mr. Corbet Woodall and Mr. E. H. Stevenson. The notice to purchase required by the Act was served upon the Company on the 20th of October; and the matter was referred to the Arbitrators—the former acting for the Company, and the latter for the Council. On the 1st inst., the news was received at Leigh that the sum awarded was £9931, with £133 costs. As

there was an opinion prevalent among the members of the Council that £6000 would be the outside figure that would have to be paid for the works, the Chairman (Dr. Vernon) and two of his colleagues had an interview with Mr. Stevenson on the matter; with the result that the explanations he was able to give were perfectly satisfactory. The award came before the Council at their meeting on the 7th inst. It set forth, in the usual way, the circumstances under which it had been made, and specified that the £9931 included a sum of £150 for the coal and the movable stock-in-trade of the Company, subject to a supplemental award should the stock be of greater or less value than this at the date of purchase, which was fixed at Jan. 1, 1900. In the event of any capital expenditure on the works being required by the Council before that day, they were to bear it; and if the purchase-money was not fully paid, interest at the rate of 4 per cent. per annum might be charged. The Clerk to the Council (Mr. G. E. Wright-Motion) presented a special report upon the award. In the course thereof, he said he had made an investigation of Messrs. While's books, and found therefrom that the profit for the year 1897 was about £250. Prior to the award being made, however, the accounts had been thoroughly investigated by a firm of chartered accountants agreed upon by the Arbitrators; and their certified profit for 1897 was considerably more than he had put it at; while for 1898 it was £510. The profits had been increasing at the rate of something like 20 per cent. per annum, and seemed likely to continue to do so. The price to be paid, according to the award, was £9931, to which must be put the costs, £133; making a total of £10,064. This money he was endeavouring to obtain from the Public Works Loan Commissioners, and if they granted the loan, it would be at 3 per cent. for a period of 40 years. The annual repayment would amount, in round figures, to £433; thus showing, on the profits of 1898, a surplus, after paying all outgoings. Of course, the working expenses were deducted from the gross profit before arriving at the figure of £510. He pointed out that in the purchase price the sum of £150 was included for coal, coke, &c. There was also included capital expenditure made by the vendors during the last year or two. This had simply been included as the amount expended; and no profit had been added to it. The award also provided that, from the date of the award, no further expenditure on capital account was to be made by the vendors without the Council's sanction. It was very desirable, however, that whatever applications came in for gas supply should be at once attended to. When the purchase was completed, the Council would simply pay the amount of this capital expenditure to Messrs. While, who would, of course, have the benefit of it until the end of the year, and would be entitled to whatever small profit it might bring in.

The Chairman proposed that the Council should obtain £11,000 for the purposes of the gas undertaking; and Mr. Watson seconded the motion. Mr. Saunt expressed the hope that the figures given as to the profits were correct, and that the year 1899 would bring in twice as much as its predecessor, for it would be badly needed. When the Council first thought of purchasing the undertaking, Messrs. While asked £8500 for it. The Council felt that this sum was too large, in view of the state of the works. This price, however, had been increased by the Arbitrators. He did not know whether Mr. Stevenson was allowed any limit to which to go without referring to an umpire. It was a question that required very careful consideration, whether they should agree to the price without going to the umpire. He did not feel much inclined to criticize the wisdom of purchasing the undertaking now, as it had gone too far; but it behoved all of them to do what they could to carry the thing through, and make the best of it for the ratepayers. Mr. Tomlin endorsed Mr. Saunt's last remarks. The thing was now practically done; and everyone must do his best to make the undertaking a success. Mr. Watson, one of the councillors who waited upon Mr. Stevenson, with the Chairman, said he was pleased to have the opportunity of going into the matter with him; for, among other things, they found that, instead of the profits of the concern being £250, they were actually £500. Mr. Saunt might take the figures as absolute facts—they were quite reliable; and there was every reason to think that for the year 1900 the profits would be £700. Borrowing £10,000 for 40 years, and allowing liberally for working expenses, he calculated £150 would stand to the credit of the Council on the first year's working. It might be said to be prophecy by some of the members. But, at any rate, it was almost certain the profits would be £600. Since the £8500 was asked for the works, nearly £1200 had been spent upon them. One point about the report of the Engineer was very satisfactory. He was willing to wait the test of time as to the success of the works. He told them: "Before you judge as to the price of these works, wait and put it to the test." He told the Council he would leave them to be the judges when they saw how the whole thing worked out. As to the state of the plant, Mr. Stevenson knew perfectly well what condition it was in; and he had given it as his opinion that, considering the profits and the whole concern as it stood, the works were being sold as cheap as, or cheaper than, any he had ever known. This was the opinion of a man who was competent to judge. The Chairman said he, like other members of the Council, thought the amount awarded was higher than they were led to expect; but when he heard Mr. Stevenson's explanation and statement, he came to the conclusion that they had what would be a bargain for the parish. One remark made by Mr. Stevenson assured him of that. He said: "You need not be at all afraid of your profits. If you are, you have only to say so, and I will take the concern off your hands at the price paid for it, and pay all your expenses." The motion was carried.

New Water-Works for Otley.—At a special meeting of the Otley District Council last Tuesday, it was decided to promote a Bill in Parliament to enable the Council to purchase (by compulsion or agreement) the waters of March Ghyll and its tributaries, in the township of Middleton, and also land for the purpose of constructing a reservoir to supply Otley with water. The scheme is estimated to cost £43,000. Last year the Council failed to obtain the right to impound the waters of Bow Beck—a stream in the same locality; and it was then generally thought that the project was too large, it being estimated to cost £50,000. The Council are of opinion that the present means of supply (the greater portion of which is from a bore-hole at Menston) is not one with which they ought to rest contented.

COAL MINERS' WAGES AND THE PRICE OF COAL.

In the present abnormal state of the coal market, the following statistics, published by the Board of Trade, are of interest, and will be of use for purposes of reference—especially the table showing the percentage above or below the standard rates at which wages stood in the various mining districts at the end of each of the last fourteen years, and that showing the approximate average price of coal per ton during the same period.

The practice in the coal mining industry is to regulate the general rate of wages by percentage increases or decreases on the rates paid in a given year—the rates paid in the various collieries in that year constituting the standard or base-line on which all subsequent changes are calculated. Thus in Northumberland, Durham, and South Wales the tonnage or field rates paid at certain dates in 1879 constitute the standard, while in the Federated Districts of England and Wales, and in Scotland, the 1888 rates form the basis.

The following table shows the percentage above or below standard at which wages stood at the end of each year (1886 to 1899) in the principal districts:—

Year.	Northumberland.	Durham.	Federated Districts.*	S. Wales & Mon.	Fife and Clackmannan.	West Scotland.
	PERCENTAGE OF WAGES ABOVE STANDARD AT END OF EACH YEAR.					
1886	At Standard	3¾	At Standard	5	At Standard	6½†
1887	12½†	3¾	At Standard	2½	10	2½†
1888	7½†	3¾	10	7½	5	8½
1889	10	25	20	25	37½	50
1890	31¼	30	40	52½	50	50
1891	30	35	40	53¾	50	50
1892	20	25	40	22½	25	25
1893	20	25	40	20	37½	50
1894	17½	25	30	21¼	25	25
1895	7½	15	30	12½	12½	12½
1896	3¾	15	30	10	At Standard	12½
1897	6¼	17½	30	11¼	12½	12½
1898	18¾	25	32½	20	42½	50
1899‡	25	33¾	40	28¾	53¾	56¼

* Yorkshire, Lancashire, Cheshire, Derbyshire, Nottingham, Leicester, Shropshire, part of Stafford, part of Worcester, Warwick, Bristol, and North Wales.
† Below standard. ‡ End of October.

This table enables the general rise and fall of wages in each district to be traced from year to year; and it will be seen that the wages of coal miners are subject to considerable fluctuations in most of the districts. For example, the wages of the Northumberland hewers at the end of 1888 were 7½ per cent. below standard, but at the end of 1890 they were 31¼ per cent. above. From this they declined steadily to 3¾ per cent. above standard in 1896, but now stand at 25 per cent. above standard.

Taking all districts together, it will be seen that from 1888 to 1891 wages rose very rapidly; from 1892 to 1896 they steadily fell; and during the last three years they have been rising again towards the 1891 level.

In the following table the net effect upon the weekly wages bill of the country of all changes in the coal-mining industry reported to the Department is shown for the seven years 1893-99:—

Year.	No. of Workpeople (Separate Individuals) Affected by Changes.	Net Effect of Changes on Weekly Wages.	
		Increases.	Decreases.
1893	292,000	£14,850	..
1894	526,000	..	£46,180
1895	314,000	..	31,720
1896	203,000	..	5,660
1897	240,000	6,560	..
1898	660,000	56,600	..
1899	611,000	46,000	..

In nearly every district methods have been arranged between the representatives of the employers and workpeople for the amicable settlement of wages questions. The methods at present adopted in each coal district can be readily shown in tabular form.

District.	Approximate Number of Miners whose Wages are Regulated by		
	Sliding-Scales.	Conciliation and Wages Boards.	Negotiation between Representatives of Employers and Workpeople.
Northumberland	..	..	32,500
Durham	..	103,000	..
Federated districts	..	300,000	..
S. Staffordshire and E. Worcestershire	..	10,000	..
Forest of Dean	..	..	5,000
South Wales and Monmouthshire	125,000	..	..
Scotland	..	80,000	..
Total	125,000	493,000	37,500

This table shows that the most general method at the present time for

determining changes in miners' wages is that of a Conciliation Board. The only district in which wages are now regulated by an automatic sliding-scale is South Wales and Monmouthshire, where wages vary with variations in the ascertained selling price. In Northumberland, the average selling price is ascertained and published quarterly. It is possible, therefore, to give below the ascertained averages in these districts during recent years. The approximate average price per ton at the mines of all coal raised in the United Kingdom, as published in the Home Office reports, is also added.

Year.	Average Price of Coal per Ton.		
	In Northumberland, for all Classes at the Pit Mouth.	In South Wales, for Certain Classes Free on Board.	In the United Kingdom, at the Mines. (Home Office Reports.)
	s. d.	s. d.	s. d.
1886	4 7·23	8 4·770	4 10 50
1887	..	8 0·250	4 9·87
1888	4 4 82*	8 4·230	5 0 69
1889	5 4·70	10 5 380	6 4·25
1890	7 7·65	12 0·300†	8 3·00
1891	7 4·06	13 4·850†	8 0·00
1892	6 6·50	11 6·840†	7 3 00
1893	5 11·35	9 8·680	6 9·51
1894	6 5·99	10 9·335	6 7·43
1895	5 6·68	9 6·949	6 0·42
1896	5 0·74	9 1·701	5 10·26
1897	5 2·91	9 2·837	5 10·93
1898	6 1·36	‡	6 4·22
1899	6 10·88§	..	..

* One ascertainment only.
† In 1890, 1891, and 1892, the selling price of large, colliery-screened coal produced from anthracite collieries was excluded in obtaining the average.
‡ The general average for the year 1898 has not yet been furnished. The sliding-scale was in abeyance from the 31st of March till the 1st of September.
§ For nine months.

THE COMPARATIVE COST OF GAS AND ELECTRICITY FOR STREET LIGHTING.

The question whether electricity is cheaper than gas for street lighting crops up now and again at Plymouth, and gives rise to newspaper correspondence. A good many figures necessarily enter into it; and the contention of the advocates of electric lighting that, light for light, electricity costs less than gas, appears to produce some confusion in the minds of non-scientific people. The most recent discussion was provoked by a reference in one of the newspapers to the fact that at Liverpool, with electricity at 2d. per unit and gas at 2s. 6d. per 1000 cubic feet, the cost of street lighting worked out at £546 8s. 9d. per mile in the case of electric arc lamps, £127 per mile in the case of double-burner incandescent lamps, and £89 10s. per mile with single-burner incandescent lamps. This provoked inquiry as to what the cost is in Plymouth. An obviously inspired article appeared in one of the papers. It set out with a sneer at Mr. C. R. Bellamy, the Superintendent of the Public Lighting Department of the Liverpool Corporation, who was consulted by the Plymouth Corporation in the spring of 1898 as to the lighting of the streets not included in the electric lighting scheme. Much was made of the fact that Mr. Bellamy estimated the cost of 10-ampère lamps, with columns and fittings, at £55 each, and their maintenance, with electricity at 3d. per unit, at £21 8s. 7d.; whereas the cost of the lamps erected in Plymouth has been £25 8s. each, and the charge for current and maintenance is £16. This, however, was only preliminary to the admission that, even at the lower price, the annual cost of the 74 arc lamps comes to £1184, as against "close upon" £500, the cost of lighting and "trimming" the 123 gas-lamps displaced. "It must be remembered," continued the writer of the article, "that for the increased cost of 2½ times as much, the candle power of electric lighting is 23 times greater than was given by gas; or, in other words, the present illumination is nine times as great for the same outlay upon gas." The writer went on to deal with the real question at issue—viz., the comparative cost of electric arc lighting and incandescent gas lighting per mile of street. It was pointed out that while in Liverpool the cost of electric lighting worked out to £546, in Plymouth, with a charge of £16 per lamp per annum, the actual cost per mile per annum is £347. "Adopting the Liverpool figure of £127 per mile for double-burner incandescent lighting, it will be seen that electric lighting in Plymouth is four times as costly as the adoption of incandescent lamps would be with gas supplied at 1s. 9d. per 1000 cubic feet." Perhaps unintentionally, the writer then confuses the issue by remarking that, "compared with what previously existed, the cost of electricity is cheaper than what was paid for gas, light for light, notwithstanding that the total annual charges are greater than they were, as the extra illuminating power obtained is greater relatively than the difference in the expenditure; the increase on the one hand being 2½, and in the other 23." This is very much open to question; but, in any case, it is beside the point, which is whether electric light is comparable in point of cost with incandescent gas lighting. The writer gets back to this subject in the next sentence, in which he says that "while, on the basis of the Liverpool figure of £127 per mile for double-burner incandescent lighting, the cost of electricity is four times as much, yet the illumination given by the latter power is ten times greater than would be obtained by the former." It is finally claimed to be "obvious," from these figures, that "in order to produce the same illuminating power, by whatever system of gas lighting might be adopted, as that now given by electricity, an expenditure would be necessary which would equal, if it did not exceed, the amount incurred by the adoption of the electric light."

The deduction was not so obvious as to pass without challenge. Mr. P. S. Hoyte, the Assistant-Engineer to the Plymouth Gas Company, writing to the same paper, brought the question to a very simple and practical test. In Plymouth there are two streets, of almost equal length, running nearly parallel, one of which is lighted by electric arc lamps, and the other by incandescent gas-lamps. Ebrington Street, 562 yards in length, has seven arc lamps, equal to 21·9 per mile; Treville Street, 587 yards in length, has 13 incandescent gas-lamps, or 39 per mile. The cost per mile calculated on the above data is: For electric arc lighting, at £16 per lamp, £350 8s. per annum. For incandescent gas, 39 lamps, at 4½ cubic feet per hour, for 3000 hours, or 526,500 cubic feet, at 1s. 8d. per 1000, £43 17s. 6d.; four renewals per burner per annum, at 1s. 4d., £10 8s.; attendance (say), £10—total, £64 5s. 6d. As to the capital outlay, the seven arc lamp, at £25 8s. each cost £177 10s.; while the thirteen columns and lamps for gas lighting would not cost more than £45. "This, then," says Mr. Hoyte, "is the true relative cost of the electric light and incandescent gas single burner in two parallel streets of practically the same length. These figures show that the ratepayers, upon the figures as given above, pay nearly six times more for the electric light in Ebrington Street than for the incandescent gas-light in Treville Street, *plus* £132 16s. additional outlay on the electric light for equipment." Mr. Hoyte urges, in order that the public may have a fair opportunity of judging of the relative cost and efficiency of the two systems of lighting, that two other streets, of about the same length, breadth, &c., should be selected, one to be lighted by electric arc lamps, and the other by double incandescent burners. He thinks single incandescent burners hardly do justice to the system in some of the wide and tree-lined thoroughfares in which they have been placed.

ELECTRIC LIGHTING IN THE CITY OF LONDON.

The Annual Report of the Electrical Engineer.

The Electrical Engineer and Inspector to the Corporation of London, under the City of London Electric Lighting Orders, 1890 and 1891 (Mr. A. A. Voysey), has presented to the Streets Committee his annual report; and it has lately been issued. It furnishes an account of his work during the year ending Dec. 31, 1898, which deals with electrical testing, the electric lighting of the main and side streets, and the private electric lighting. He states that 46 instruments were submitted to him for testing. The bulk of them were meters, and were sent by consumers who doubted the accuracy of their registrations. The tests showed that 19·35 per cent. were slow, 25·8 per cent. fast, and 54·85 per cent. approximately correct. The maximum percentage of error in the slow meters was 9; the mean percentage, 5·3. The corresponding errors in the fast meters were 13·1 and 7·6 respectively. Mr. Voysey says these results do not differ greatly from those recorded during the previous year. The testing fees amounted to £31 7s. 6d.; making a total of £192 2s. received since the testing laboratory was established 3½ years ago. The Board of Trade have recently approved of the Aron meter for use in the City alternating circuit currents. Mr. Voysey anticipates that the usefulness of the laboratory will thereby be greatly increased; and he thinks the expenses ought in time to be met by the fees received. At the close of the year covered by the report, there were 502 arc lamps in use, as against 493 on the corresponding date in the previous year. The number of failures reported by the police was 558; and 88 were reported by Mr. Voysey—together 646. In 1897, the numbers were 1306 and 160 respectively; or a total of 1466. The average time of extinction was 220·8 minutes per lamp in 1898, against 236·8 minutes in 1897. There were 248 lamps late in starting, as compared with 98 in 1897; the average number of minutes being 12 and 7·9. Penalties to the amount of £156 7s. 3d. were inflicted last year on the supplying Company (the City of London Electric Lighting Company) for these failures and delays, as compared with £352 1s. in 1897. The number of occasions on which groups of lamps failed last year was 6, against 24 in 1897. Mr. Voysey calls special attention to this fact, and says it may be taken as an indication of the importance of the changes made in the cables which in the latter year caused so much interruption to the public lighting. He states that great endeavours were made during the year to obtain the establishment of proper instruments to enable the Corporation to be advised as to whether or not they are getting the value of the supply to the public lamps for which they pay. After much delay, several appliances have been submitted by the Company to the Board of Trade, whose approval of some type of instrument is necessary for the satisfactory settlement of the matter. The question of lighting the side streets of the City has been delayed for another year, with the hope of obtaining a legal settlement of the differences between the Streets Committee and the Company as to the meaning of the agreements for public lighting. There were two interruptions of the private supply last year—one being, as Mr. Voysey understands, confined to the area supplied by the Copthall Court transformer station, and the other to the western district of the City. He says it is fair to the Company to point out that the first-mentioned interruption was attributed to the damage done to a main by a pavement contractor. Serious defects in the pressure of the supply occurred on eight different occasions; and the explanation of the circumstances by the Company justifies the hope that they may not be repeated.

ELECTRIC LIGHTING NOTES.

The Redcar District Council on Wednesday resolved to take steps to obtain an Electric Lighting Order, for the purpose of undertaking a scheme which, it is calculated, will cost about £8000.

The Lighting Committee of the Wolverhampton Corporation report that the accounts for the year ended March 31 last show a net profit of £1004. The demand for electric light still increases; the total number of lamps having risen from 16,853 of 8-candle power each, in October, 1898, to 21,542 in September, 1899. There has also been an increase of 44·77 per cent. in the current used by private consumers.

There was no opposition at an inquiry held last Tuesday by Colonel C. H. Luard into an application by the Bootle Town Council for £16,393 for electric lighting purposes, and £3426 for public lighting. Of the first-named sum, £15,393 is required for additional mains and feeders; and the remainder for a new boiler and connections at the electric lighting station. The £3426 is to be spent on arc and incandescent lamps.

The York City Council agreed on Tuesday last to extensions of the

electric distribution system, involving an outlay of £3406. Members also benevolently decided to supply churches, chapels, and other places of worship with current at 3¼d. per unit. They are considering a proposal to expend something like £20,000 in purchasing the tramways, presumably for the purpose of getting a big supporter for the electricity establishment.

While the Colwyn Bay District Council are (as will be seen by a paragraph in another column) seeking authority to purchase the gas-works, they are also desirous of borrowing £5120 for the provision of an electric lighting system, which it is considered by some is absolutely necessary for the progress of the town. But a contrary view is held by certain influential residents; and at an inquiry by Colonel A. C. Smith into the matter on Thursday last, they offered opposition which it is believed will have considerable weight with the Local Government Board.

Mr. C. E. Botley, the Engineer and Manager of the Hastings and St. Leonards Gas Company, is determined that the inhabitants of those towns shall not be led away by glowing, and erroneous, statements of electric light canvassers as to the economy realizable by the use of their light instead of gas; for he is freely circulating a neatly printed circular in which he shows, in a few words, that, when consumed with good burners, gas is more than twice as cheap as electricity, at the prices locally current, and when used with incandescent burners, eight times as cheap. Expressed in figures, electricity must be sold at about 3d. per unit to compare with gas at 3s. per 1000 cubic feet when consumed with good ordinary burners, and at ¾d. per unit with incandescent burners. As the present average price of electricity at Hastings, for current only, is about 7¾d. per unit, there must be a considerable reduction before this illuminant can be run against gas on the score of cheapness. If, notwithstanding such judicious hints as these, consumers allow themselves to be persuaded into the adoption of a light which they afterwards find to be too costly for them, they will only have themselves to blame.

The electric lighting system in Harrogate was introduced three years ago; and already the Local Government Board have sanctioned the spending of £40,996 upon it. It is now necessary to again extend the works; and this will entail a further amount of £28,000. For permission to borrow this sum, application has been made by the Corporation to the Local Government Board, one of whose Inspectors (Mr. F. H. Tulloch) investigated the matter last Thursday. The Borough Electrical Engineer (Mr. Wilkinson) was the principal witness; and he stated that during the past twelve months the number of lamps and mains had doubled, and they had now connected to their mains 22,341 lamps. Last year no profit was made; but this year there was a profit of above £700, after meeting sinking fund and all charges against them. There were also the profits of November and December to be added. The capital outlay compared very favourably with that of other towns. That at Hastings was £137 per kilowatt of plant, Eastbourne £133, Bournemouth £165, Southport £113, Cheltenham £143, Blackpool £79, and Harrogate £67. Another 600-horse power plant, additional mains, and a switch station were required.

Evidently there has been a false impression abroad with reference to the little Suffolk town of Sudbury. It has been regarded by many as one of the drowsiest of drowsy places; but to hold, or give expression to, such an opinion now, would be to libel it. It must possess some vitality latent to all but the town councillors; for these worthy gentlemen have such faith in it that they have just made public to the world that they intend applying for a Provisional Order to enable them to carry out an electric lighting and refuse destruction scheme. There are indications, too, that they intend pressing the matter forward. We are, however, afraid that this is an example of a prodigious faith resting on a frail foundation. It does not seem that any deep inquiries have been made into the matter before coming to a decision; for when the question was before the Council last Tuesday, the Mayor (Mr. F. Wheeler), on an inquiry, could not say what would be the amount of the loan needed for the purpose, but he could say that in every case of the kind he had looked into a "considerable profit" had been made by adopting the light. We are afraid Mr. Wheeler's investigations have been somewhat limited; and he has overlooked the simple fact that other towns are not Sudbury.

The Dawlish District Council soon found reason to repent of the resolution which they passed in favour of applying for a Provisional Order for electric lighting. A meeting of the ratepayers was called for Saturday week to endorse the resolution; but instead of doing so, it was decided, by a large majority, that no further steps should be taken in the matter. One of the speakers at the meeting pointed out that, in calculating the probable return on the outlay, more than one-fifth of the population were counted as probable consumers. A further discussion on the subject took place at a meeting of the Council last Wednesday. Some of the members were in favour of proceeding with the application in spite of the adverse decision of the meeting, which, it was contended, was not representative of the general body of ratepayers. On the other hand, it was argued that it was impossible for the Council to make electric lighting pay, and that instead of realizing a profit they were likely to incur a loss of £500 per annum. It was suggested that the inhabitants of the town who criticized the action of the Council ought themselves to manage its affairs, and that there would be further complaining if that body took no means to prevent a private company obtaining a Provisional Order for the supply of electric light. The Chairman of the Council thought, however, that a private company would not do the town any harm by getting an Order. If they liked to spend money over the electric light, Dawlish need not object. Notice was nevertheless given of a resolution pledging the Council to oppose any private application for an Order.

Last Friday, Colonel C. H. Luard, R.E., held an inquiry on behalf of the Local Government Board into an application by the Liverpool Corporation for authority to borrow £300,000 for electric lighting purposes. The Town Clerk (Mr. H. E. Clare) stated that the Corporation purchased the electric supply undertaking in 1896; and a sum of £500,000 was authorized to be raised for the purpose of the works. This money had already been spent, and also the further sum of £100,000 borrowed under two separate sanctions obtained in 1897 and 1899. He referred to the great progress made in Liverpool with electric lighting, and to the reduction in the charges, which in 1896 were 7½d. per unit for lighting and 5d. for power, and were now 4d. for private lighting, 2d. for public lighting, and 2d. and 1d. for power. Notwithstanding this material reduction in the charges, a profit of more than £8000 was made in 1898, after providing for the sinking fund and interest. The demand for electric light was increasing; and the extension which would be carried out with the money now asked for would, no doubt, create a very large additional use. Another important factor was the acquisition by the Corporation of the tramways, and the introduction of electrical haulage, which had largely increased the demand upon the electric lighting stations. It had, in fact, been found necessary to enlarge the stations. The Corporation would really require £380,000 to carry out the works decided upon. Although the £300,000 might seem a large sum, the Corporation would at no distant date have to ask for powers to borrow a further amount. The cost of buildings, land, &c., for stations would reach £102,000, the plant would cost £167,300, and the mains £119,400. Mr. A. Bromley Holmes (Electrical Engineer) and Mr. Shelmerdine (Surveyor) explained the details of the scheme.

An inquiry has lately been held at Yarmouth, by Mr. G. W. Willcocks, on behalf of the Local Government Board, with regard to an application by the Corporation for a further loan of £27,000 for the extension of the electric light system. The Surveyor (Mr. J. W. Cockrill) stated that the electric light works were commenced in 1894 with 700 8-candle power lamps. By January, 1895, they had also 52 arc lamps for street lighting, and at the end of that year 5800 8-candle lamps. In 1896, there were 8400 of these lamps in use; in 1897, 10,600; in 1898, 14,500; and by Jan. 1, 1899, 18,900, and also 62 arc lamps for street lighting. The financial result of the undertaking was that all the expenses of running, interest, &c., had always been met; and out of £3524 of the loans repaid, the following sums had to be provided from the rates: Jan. 1, 1895, to Jan. 1, 1896, £766; Jan. 1, 1896, to March 1, 1897, £726; March 1, 1897, to March 31, 1898, £400; March 31, 1898, to March 31, 1899, nothing out of the rates, but £57, which was repayment of the capital cost beyond the amount earned, was carried into the present year's accounts. The total paid out of the rates towards the sinking fund had been £1892; but £1632 had been earned by the undertaking towards these payments. The total capital expenditure on works up to the present was £38,615; and the loans sanctioned amounted to £40,000—the balance of £1385, not yet spent, being principally for mains in Yarmouth that would be laid down as required by additional customers. The total production was 530 kilowatts, which provided power for 15,700 8-candle lamps; but there were now 19,917 lamps. This showed the urgent need for the extensions proposed. In addition to the plant named, there were four arc light machines for 30 lamps, giving a total of 590 kilowatts, provided at a cost of £67 per kilowatt. In the quarter of the present year ending June, £12 was earned beyond all charges; and in the quarter ending Sept. 30, £77. As these two periods were the worst in the year, his opinion was that not less than £500 would be earned by the undertaking this year, after paying all working expenses, interest, and sinking-fund charges, rates, taxes, a portion of the cost of administration, and all charges incidental to working.

ALDEBURGH WATER-WORKS PURCHASE.

For a long period, the question of the purchase of the Aldeburgh Water-Works by the Corporation bid fair to become an interminable one. For almost twenty years past it has been revived at intervals; but now the end appears to be in sight. On behalf of the Local Government Board, an inquiry was held last Wednesday by Mr. H. Percy Boulnois respecting an application by the Corporation for sanction to the purchase. From the history laid before the Inspector by the Town Clerk (Mr. H. C. Casley), it appeared that, in their early days, the Company experienced some financial difficulty; and the Corporation on several occasions assisted them by advancing money. There was also trouble with the water; the sea making it brackish. It was in 1880-1 that overtures were first made to buy the undertaking; but they fell through, as the Company were not prepared to accept the price offered. In 1893, it was again deemed expedient to negotiate for the purchase of the undertaking; but it was not till 1896, when the preliminary preparations had been settled, that the Company were asked to sell. On April 22 of that year, an intimation was received that the shareholders were prepared to dispose of their property for £5000; and in July Mr. James Mansergh was asked to report upon the undertaking. But an analytical report by the late Sir Edward Frankland was of such a character that negotiations were for the time suspended. The Committee, who were appointed to act in the matter, felt it their duty, in the interests of the public health, to send Sir Edward's analysis to the Public Health Committee. Lengthy correspondence took place between that body and the Company as to the town being given a pure supply. In January, 1897, the Company intimated they had disconnected the source of the impure supply, and had commenced constructing a new reservoir. On Feb. 8, 1897, the Company communicated to the Council that they withdrew their offer to sell on the previous terms, but intimated they were willing to do so at a revised price. As complaints were received from the public, the Company engaged the late Sir Edward Frankland to analyze the new supply; but no copy of his report could be obtained by the Corporation. After further correspondence, negotiations were re-opened on May 25, 1898; and ultimately, on Dec. 18, the Directors said they were willing that a draft agreement be submitted to the Council. The result was that the agreement was approved in May of this year by the Council, whose seal was placed upon it. During 28 years the Company had certainly furnished the town with a supply of water which had not been as pure as it might have been, although perhaps it was better than the inadequate supply obtainable from private wells, many of which had been closed. It appeared to the Council to be imperative that the first step towards any improvement of the water was the acquisition of the works; and it had been agreed that the price to be paid for them was to be fixed by Arbitrators. Evidence was given as to the condition of the supply, and the works which were considered necessary to put the service and system into satisfactory order. At the close of the inquiry, the Inspector examined the works.

The Leeds Water-Works Committee have purchased, subject to the approval of the City Council, Scow Hall Farm, including the buildings and about 86 acres of land, at Clifton-with-Norwood. The price is £4275.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I saw the remark made the other day that in the forthcoming session Parliament would be called upon to deal with a larger number of Bills from Scotland than usual, because it will be the last session in which inquiries into Scotch measures will be conducted at Westminster. This statement is not very complimentary to the system of local inquiries which is to succeed the present; but, of course, it may not be borne out. The only Gas Bill from Scotland which I am aware of is to be sent up from Falkirk. In fact, Falkirk and district will bulk very largely before Parliamentary Committees next spring. Notice has been given of a Corporation Bill for the erection of new gas-works and the extension of the burgh boundaries; by the Falkirk and Larbert Water Trust, for the construction of works for augmenting the water supply, according to plans prepared by Mr. W. R. Copland, and already described in the "JOURNAL;" and by the North British Railway Company, who are promoting a Bill to give them powers to extend their system in the neighbourhood of Falkirk.

The Gas Bill asks power to acquire land for the construction of works, and for the disposal of the old works and site. For the new works two areas are scheduled—one of 14½ acres at Forganhall, to the north-west, partly without and partly within the burgh; and the other of 13¼ acres, to the south of the Forth and Clyde Canal, all within the burgh. One of the sites can be dropped when the time comes. Additional borrowing powers to the amount, I believe, of £80,000 are also to be asked for. The resolution to proceed was not agreed to, as may be supposed, without opposition. The fact is that Falkirk stands in a most peculiar position in regard to gas affairs. Since the Commissioners came into existence in 1895, they have dismantled and sold one gas-works, which was, perhaps, not of much account, as they appeared to be small and not well situated. But the concentration of the gas supply upon the remaining works proved too much for them; and the Commissioners have expended about £30,000 in equipping and patching up these works. They have now, therefore, a debt of £120,000. As a matter of fact, they have only borrowing powers left to the amount of £46. In these circumstances, the Commissioners were bound to go to Parliament soon for power to borrow more money. But a worse feature of the situation remains. The Commission have already, under statutory sanction, acquired a site for a new gas-works at Parkhouse, to the west of the town, between the railway and the canal; and upon this site they have erected a large gasholder. Mr. J. M'Gilchrist, of Dumbarton, is the Engineer to the Commissioners; and he has reported against the Parkhouse site as being unsuitable for a gas-works, in consequence of its being too small, and the bottom being mossy. Indeed, the gasholder at Parkhouse, which is a wire-rope guided one, subsided at one side, and gave some trouble. Mr. M'Gilchrist is in favour of the holder being removed to the new site, and the whole of the ground at Parkhouse sold. Apart from the questions of size and foundations, the site at Parkhouse is most convenient, having both railway and canal connections. It was not surprising, therefore, that some members of the Commission, including Provost Weir and Treasurer Mitchell, should have hesitated before agreeing to throw over the Parkhouse site and acquire another. The opposition, however, was not serious. It was confined to criticism; no counter motion being proposed to that of Bailie Cook Rennie, the Convener of the Works Committee, who moved that the Bill be proceeded with.

Mr. M'Gilchrist, in his report to the Commission, points out that the consumption of gas has gone up from 66 million cubic feet in 1895 to 104 millions now—an increase of, roughly, 57 per cent. This he considers is, perhaps, the largest increase in consumption of gas in any undertaking in the United Kingdom, and is a clear proof of the growing importance of the district. On the basis of 10 per cent. increase, he estimates the consumption of gas seven years hence at 202 million cubic feet. Last winter, with every available retort at work, the maximum daily make was 560,000 cubic feet; in two years' time, with 10 per cent. increase, it will be 677,000 cubic feet. Last winter they were not able to produce the quantity of gas required. This year there has been, since May 15, an increase of 4,300,000 cubic feet over last year. The improvement in the heating of the retorts may carry them over this winter; but as every inch of ground in the works is now occupied, the following one must be a trying period to all concerned. He concludes that it is now the bounden duty of the Commission to provide new gas-works. Mr. M'Gilchrist's convincing report, and his oral recommendations, carried the Commissioners to a resolution to proceed. It is an awkward situation to advise in, because of the complications; but I have no doubt that Mr. M'Gilchrist has counted the cost, and is convinced that it will be profitable to abandon Parkhouse and seek another site. There is little question as to the removal of the works. The difficulties have arisen by reason of the large expenditure upon the old works and the acquisition of the ground at Parkhouse. A capital of, nominally, £180,000 hanging round the neck of the Commission, will make it imperative that the undertaking be conducted with care. Falkirk, it is evident, is in trouble over its gas and water supplies and its boundaries. This situation is almost entirely due to the very rapid growth of the town in recent years; but there must have been a great lack of a public man who was able to estimate the coming prosperity, and to persuade his fellow citizens to prepare for it. The Corporation seem to be better advised now than they have been; and a repetition of the mistakes of the past need not be looked for.

The gentlemen who are responsible for the agitation which is being promoted among gas workers are, as was to have been expected, not satisfied with what they have attained, though that has been considerable. It is not so much the benefit of the men which they seek, as their own power. The existence of the practice of men employed in the Glasgow Gas-Works signing-on for a definite period, prevents their being able to bring the pressure of a strike upon the Corporation; and, consequently, another effort is to be made to have signing-on abolished. It is in the Tradeston works that this step is being taken. The workers there have resolved to refuse to renew the agreement. This involves the relinquishment of a bonus of 1s. per week to each man who fulfils his part of the agreement satisfactorily. The workers must be persuaded that they are likely to obtain an equivalent for this 1s., or they would not

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1239.

Issue.	Share.	When due Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	21—22	..	4 15 5
100,000	10	,,	7½	Do. 7 p. c.	15—16	..	4 13 9
300,000	100	July 3	5	Australian 5 p. c. Deb.	102—104	..	4 16 2
200,000	5	Nov. 15	6	Bombay, Ltd.	5⅞—6¼*	..	4 8 11
40,000	5	,,	6	Do. New, £4 paid	4—4¼*	..	5 6 8
380,000	Stk.	Aug. 16	12	Brentford Consolidated	273—278	..	4 6 4
270,000	,,	,,	9	Do. New	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	,,	June 15	4	Do. 4 p. c. Deb.	126—130	..	3 1 7
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	255—265	..	4 6 9
226,320	,,	,,	8½	Do. A. Ord. Stk.	187—192	..	4 8 7
973,500	Stk.	Aug. 16	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	43¼—44¼	..	4 9 10
50,000	10	Aug. 31	12	Bromley, Ord. 10 p. c.	24—26	..	4 12 3
75,000	10	,,	9	Do. 7 p. c.	19—21	..	4 5 8
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	9¼—10	..	6 0 0
220,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
150,000	20	July 13	8½	Cagliari, Ltd.	28—29	..	5 13 10
100,000	10	Sept. 29	8	Cape Town & Dis., Ltd.	13¾—14¼	..	5 10 4
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Oct. 13	13½	Commercial Old Stock	308—313	..	4 6 3
200,750	,,	,,	10½	Do. New do.	240—245	..	4 5 9
200,750	,,	June 15	4½	Do. 4½ p. c. Deb.	143—148	..	3 0 10
800,000	Stk.	June 15	9†	Continental Union, Ltd.	185—190	+5	4 14 9
200,000	,,	,,	7	Do. 7 p. c. Pref.	182—187	..	3 14 10
51,600	Stk.	Aug. 31	14	Croydon A 10 p. c.	335—340	..	4 2 4
168,400	,,	,,	11	Do. B 7 p. c.	265—270	..	4 1 5
555,000	Stk.	Aug. 16	5½	Crystal Palace Ord. 5 p. c.	130—135	−2	3 17 9
60,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd.	21⅛—22⅛	..	4 17 9
354,060	10	,,	11	Do. £7 10s. paid	16—17	+¼	4 17 1
14,993,075	Stk.	Aug. 16	4⅞	Gas-light and Coke	4 p. c. Ord.	105—107	..	4 11 7
2,609,000			3⅞		3½ p. c. max.	97—99	..	3 10 8
3,799,735	,,	,,	4		4 p. c. Con. Pref.	120—123	..	3 5 1
3,993,975	,,	June 15	3		3 p. c. Con. Deb.	99—101	..	2 19 5
70,000	10	Nov. 15	8	Hongkong & China, Ltd.	13½—14½*	..	5 10 4
3,800,000	Stk.	Nov. 15	10	Imperial Continental		218—223*	+3	4 9 8
473,600	Stk.	Aug. 16	3½	Do. 3½ p. c. Deb. Red.	101—104	..	3 7 4
75,000	5	June 15	6	Malta & Medn., Ltd.	5—5⅛	..	5 9 1
660,000	100	Oct. 2	5	Met. of Melbourne	5 p. c. Deb.	110—114	..	4 7 9
350,000	100	,,	4½		4½ p. c. Deb.	108—110	..	4 1 10
541,920	20	Nov. 15	3	Monte Video, Ltd.	10¼—11¾*	..	5 4 4
617,946	Stk.	Aug. 31	9½	Newo'tle & Gatesh'd Con.	225—230	..	4 0 5
264,855	Stk.	June 29	3½	Do. 3½ p. c. Deb.	106—109	..	3 4 3
60,000	5	Sept. 29	7	Ottoman, Ltd.	5⅛—5⅜	..	6 1 9
					*Ex div.		

Issue.	Share.	When due Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd.	7¼—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6¾—7	..	5 14 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅜	..	4 11 5
500,000	100	June 1	6	People's Gas of Chicago } 2nd Mtg. Bonds	102—106	..	5 13 3
851,070	10	Oct. 13	7	River Plate Ord.	11—11½	..	6 1 9
250,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	7 8 2
250,000	10	Sept. 15	10	San Paulo, Ltd.	12—13	..	7 13 10
185,000	Stk.	Sept. 15	10	Sheffield A.	247—249	..	4 0 4
209,053	,,	,,	10	Do. B.	247—249	..	4 0 4
447,427	,,	,,	10	Do. C.	247—249	..	4 0 4
5,600,000	Stk.	Aug. 16	5⅓	South Metrop., 4 p. c. Ord.	137—140	..	3 16 1
1,520,000	,,	July 13	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
120,000	Stk.	Aug. 31	6	Tottenham and Edmonton } A. 5 p. c. B. 3½ p. c. 4 p. c. Deb.	141—143	..	4 3 11
250,520	,,	,,	4½		102—104	..	4 6 6
55,100	,,	—	4		115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 3	5	Do. 5 p. c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	313—318	..	3 9 2
150,000	,,	,,	5	Do. 5 p. c. Pref.	163—168	..	3 19 6
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	145—150	..	3 0 0
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Deb.	150—155	..	2 18 1
1,720,560	Stk.	Oct. 13	7	East London, Ord.	203—208	..	3 7 4
654,740	,,	June 29	4½	Do. 4½ p. c. Deb.	152—157	..	2 17 4
890,000	,,	,,	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
700,000	50	June 15	7½	Grand Junction } 10 p. c. max. 4 p. c. Deb.	110—113	..	3 6 5
310,000	Stk.	Sept. 29	4		133—138	..	2 18 0
708,000	Stk.	Aug. 16	14	Kent	363—368	..	3 18 3
160,000	,,	,,	7	Do. New, 7 p. c. max.	208—213	..	3 5 9
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max.	298—303	+5	3 9 4
406,200	100	,,	8	Do. 7½ p. c. max.	225—230	..	3 9 7
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb.	136—140	..	2 17 2
500,000	100	Aug. 16	13½	New River, New Shares	428—433	..	3 2 4
1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb.	135—140	..	2 17 2
902,300	Stk.	June 15	7½	South-wark and Vauxhall } Ord. 7½ p. c. max. 5 p. c. Pref. 4 p. c. A Deb.	215—220	+3	3 8 2
126,500	100	,,	7½		193—198	..	3 15 9
489,200	Stk.	,,	5		165—170	..	2 18 10
1,019,585	,,	Oct. 13	4		131—136	..	2 18 10
1,155,066	Stk.	June 15	10	West Middlesex	298—303	..	3 6 0
200,000	,,	,,	4½	Do. 4½ p. c. Deb.	152—157	..	2 17 4
200,000	,,	Sept. 15	8	Do. 3 p. c. Deb.	101—103	..	2 18 3

† Next dividend will be at this rate.

give it up. Proceeding to take the various works in turn, the agitators apparently expect that they will be able to mass their forces unknown to the Corporation, and be ready for a final attack before the Corporation can prepare to meet them. They will probably be mistaken in this; but there, again, the scarcity of workmen will make the task of the Gas Committee a difficult one. There is an ominous passage in the annual report of the Gas Workers' and General Labourers' Union to the effect that a strong branch has been organized in Edinburgh. Something is evidently intended there; but perhaps it may only be the collection of threepences with which to fight in Glasgow and other places.

In the Corporation of Glasgow, on Monday, the Watching and Lighting Committee recommended that West Regent Street and Bath Street should be lighted by incandescent gas-lamps, for the observation and consideration of the Committee. Bailie Fife expressed regret that the Committee had selected two business streets for the experiment, and had ignored the districts occupied by the industrial classes. Mr. Primrose, the Convener, pointed out that the two streets named had been selected because there were no shops in them, and the value of the system of lighting would be thereby better demonstrated. The Committee had also given the Inspector of Lighting power to experiment at street corners and junctions; and were the tests satisfactory, incandescent gas lighting would be adopted on a large scale. The recommendation was adopted.

The subject of making an increase in the price of gas retrospective was discussed in the Arbroath Gas Corporation on Thursday evening; and the disposition seemed to be to justify the practice. The Clerk to the Corporation (Mr. D. Chapel) said that the matter was regulated by Act of Parliament. It happened that, owing to the change introduced by their new Act, they were longer this year in getting their estimates prepared. In previous years their accounts closed at May 31, and the price of gas was fixed in July; but according to the new Act, this was now done in September. Of course, they could not fix the price of gas till they knew how the accounts stood. A reduction would also take effect from the beginning of the financial year. Provost Grant said that the Corporation could not go wrong so long as they were guided by Act of Parliament. Mr. Aitken—philosophic man—remarked that parties who complained about the increase in the charge for gas being made retrospective, would have no complaint if the Corporation next year found themselves in the position of being able to reduce the price. The reduction would cover a period equal to the increase. This is simply the doctrine of restitution, which is founded on the assumption that a wrong has been done. In this case, restitution is not, however, offered; it is merely referred to as possible. If their Act of Parliament allows changes in price to be made retrospective, the Corporation are within the letter of the Statute; but I do not think it can be said that they are within the spirit of the canon law of the land.

The Perth Gas Commission have appointed Councillor Watson to be Convener of the Works Committee. At the meeting of the Commission on Monday last, the Engineer (Mr. A. Wilson) submitted a report on the subject of charging for service-pipes, which showed that Perth was the only town of any size in Scotland in which part of the services are not given free. He recommended that service-pipes should be supplied by the Commission free of cost as far as the line of the street, if within a distance of 30 feet of the main. Mr. Wilson also called attention to the circumstance that in Perth there were not, as in some other towns, rules for regulating the size of service-pipes; and he suggested that some should be enacted. The Commission adopted the recommendation about the provision of service-pipes free; but they asked Mr. Wilson to report to them regarding the regulations in force in other towns, as to the sizes of such pipes. The Commission also adopted recommendations by the Works Committee that they should pay one-half of the cost of the construction of roads and railways at the new site of the gas-works at Friarton, amounting, in their case, to £998—the other half to be borne by the Burgh Commission; that they should pay a feu duty of £15 for extra land; and that, so far as the railway was mutual, the Gas Commission and the Burgh Commission should bear the feu duty. The Treasurer to the Gas Commission was appointed Treasurer to the Electricity Department which is being created. A new bridge is being erected over the River Tay at Perth; and in respect that the Gas Commission are to have the right to lay their mains across it, it has been resolved to contribute £500 towards the cost of the bridge.

In the Police Court at Stranraer, on Tuesday, James Cain, labourer, was charged with having, on Saturday, Nov. 4, in the premises of the Gas Company, wilfully shut down the main gas-valve, and thereby put a considerable portion of the inhabitants and those using gas in their shops and premises in darkness. He pleaded not guilty. About 6.30 p.m., the gas-jets in the town suddenly went down, and a great number went out altogether. Cain had been an employee of the Gas Company, and left over a wages dispute. He said to a witness that he would be even with them. Along with another young man, he went into the gas-works, and left shortly before the gas went out. No one saw him near the valve. Cain and his companion stated that they went to the works to dry their clothes. Provost Macrobert commented on the serious nature of the charge. The Bench could not find a tittle of evidence against accused; but they hoped the Manager would see that no strangers were admitted to the works except on business. The incident is full of warning to other gas managers.

Owing to some blunder, the town of Gourock was plunged in darkness at about five o'clock last Monday. The lamplighters, who had just completed their rounds, necessarily had to start over again, and much inconvenience was caused to tradesmen.

Public Lighting by Acetylene.—The public streets of the little town of Doese, near Hamburg, are to be lighted by acetylene. The plant is being supplied by the Acetylene Industrie Gesellschaft.

Proposed Purchase of the Spalding Water-Works.—The Spalding District Council are proposing to promote a Bill in Parliament authorizing them to purchase the undertaking of the Spalding Water Company. A few years ago, the South Lincolnshire Fen Water Company made proposals for the purchase of the works; but the matter fell through, and their deposit of £1000 was forfeited to the Spalding Company.

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Complete Fire List may be had on application.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 18.

Sulphate of Ammonia.—Early in the week, buyers evidenced a greater disposition to avail themselves of the low level of prices reached; and everything offered for November and December delivery was taken up. Then £10 15s., and £10 16s. 3d. per ton, Beckton terms, was paid in London for January-March delivery; and this being the equivalent of the price for which Scotch makers have all along been holding for spring months, general buying ensued, resulting in a sharp advance in prices all round. Quotations at the close are very irregular; but, for prompt delivery, £10 16s. 3d. to £11 per ton f.o.b. at the ports are nearest values, with good inquiry in all positions. In the forward position, sales have been made at £11 to £11 5s. per ton f.o.b. at Leith; the latter being the closing quotation.

Nitrate of Soda is firm at 7s. 10½d. per cwt. for good, up to 8s. per cwt. for refined, quality.

LONDON, *Nov.* 18.

Tar Products.—By a slip of the pen the word "increased" instead of "decreased" appeared in last week's report in connection with the production of anthracene. It is estimated that the production of anthracene during the current year will be decreased 35 per cent., notwithstanding the larger quantities of tar being dealt with. The price of anthracene quoted below does not represent any business being done, but is a nominal market quotation only. Carbolic acid is still booming; and makers are asking much higher prices than quoted below, which is, however, all that buyers will pay at present. Pitch is steady; and the anticipated fall in value from dearer freights and larger production has not taken place. Solvent and the various forms of naphtha are in good request, at a shade better prices. Benzol is still a disappointing product; and the little spurt in price a week or so ago has not been maintained.

The following are to day's values: Tar, 16s. 6d. to 25s. 6d. Pitch, east coast, 34s.; west coast, 32s. Benzol, 90's, 8d.; 50's 10½d. Toluol, 90 per cent., 1s. 3d.; pure, 2s. 2d. Solvent naphtha, 1s. 3d. Heavy naphtha, 1s. 2d. Crude, 30 per cent., naphtha, 4½d. Creosote, 3d. Heavy oils, 65s. Carbolic acid, 60's, 2s. 6d.; 75's, 3s. Crude naphthalene, 57s. 6d. Anthracene, nominal, "A," 3½d.; "B," 2½d.

Sulphate of Ammonia.—There are now more buyers of this article; and during the week a distinct recovery has taken place, with an immediate prospect of higher prices. The average value at all ports is about £10 10s., less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—No further change can be reported in the position of the coal trade in this district, beyond what was referred to last week. The better qualities of round coal still meet with only a slow inquiry, and therefore remain without quotable change, though in some instances there are indications of more anxiety to press sales just at present, owing to stocks accumulating at most of the collieries. For other descriptions of fuel, the same briskness is reported, all the output of common round coals meeting with a ready sale, with prices stiffening; while engine classes of fuel are in pressing request, with a scarcity of supplies, and outside buyers are finding it increasingly difficult to place orders, except at special rates. At the pit, basis quotations for current sales remain at 12s. 6d. to 13s. 6d. per ton for best Wigan Arley, 11s. to 11s. 6d. for Pemberton four feet and seconds Arley, 10s. 6d. for common house coal, 10s. to 10s. 6d. for steam and forge coal, 7s. 3d. to 7s. 9d. for best engine fuel, 6s. 6d. to 6s. 9d. for medium, and 6s. to 6s. 3d. for common slack. The question of an official advance on these prices, though it has apparently received some check owing to the quietude in the house-coal trade, is still under consideration; and a special conference of colliery proprietors representing Lancashire and the surrounding districts is to be held in Manchester to-day (Tuesday), when the advisability of some general move will again be brought forward. In the meantime, so far as all descriptions of fuel for steam and forge and engine purposes are concerned, collieries are not entertaining business for forward delivery, except at advances on present rates of about 6d. per ton on steam and forge coal and 10d. on engine fuel. Shipping inquiry is active, with special prices having to be paid in some instances to obtain prompt supplies; and 11s. 6d. per ton is about the average figure for ordinary steam coal delivered at the ports on the Mersey. Good foundry coke is quoted at about 28s., and ordinary furnace qualities at 21s. to 22s. at the ovens.

Northern Coal Trade.—The great activity in the coal trade of the North is increasing; and the scarcity of certain kinds of coal is further forcing up prices for any quantity readily available. For best Northumbrian steam coals, the quotation is now 13s. per ton f.o.b.; and a sale has been made to the Government, for shipment to South Africa, of some 10,000 tons, at about 12s. 10d. per ton f.o.b. Steam smalls vary from 7s. 6d. to 8s. per ton. In the gas coal trade, the extreme scarcity of best Durham coals is known; and it is possible that an attempt may be made to use Northumbrian coals for gas purposes. For occasional cargoes, as high a price as 14s. per ton f.ob. is now asked, and is likely to be paid. Contracts take the great bulk of the production, so that few coalowners have much to sell; and for this little, prices are very high. There is no alteration in the demand for manufacturing coals. Gas coke, though more plentiful, is in fuller request. Quotations vary considerably; and 13s. 6d. to 14s. 6d. per ton are now the prices f.o.b. in the Tyne.

Scotch Coal Trade.—Trade continues in a state of great activity, and prices are rising. Forward orders, covering as much as a twelvemonth, are being placed at full current rates. The prices quoted are: Main, 10s. 3d. per ton f.o.b. Glasgow, ell 10s. 9d. to 11s. 6d., and splint 11s. The shipments for the week amounted to 153,292 tons—a decrease of 12,180 tons upon the previous week, and of 13,271 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,651,671 tons—a decrease of 896,194 tons upon the same period of last year.

The "CZARINA."

Season 1899.

WRIGHT'S

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The Maintenance of the Dependents of Reservists.—The Directors of Messrs. Fletcher, Russell, and Co., Limited, have unanimously decided to subscribe £150 to the funds for the above purpose—£50 to the Warrington, £50 to the Manchester, and £50 to the London funds. It was decided to make a weekly payment to the wives or other dependents of those called out, who were in the employ of the firm. This is in addition to the private subscriptions of the Directors.

Kingsbridge Water Supply.—At the request of the District Council, Messrs. J. Taylor, Sons, and Santo Crimp, the Engineers, have supplied some further particulars respecting the proposed scheme for supplying water to Kingsbridge (*ante*, p. 1139). They assure the Council that nothing in the scheme is of an experimental character. As to the quality of the water in the reservoir, they point out that, on the basis of 130 days' storage, there is little possibility of the lowest stratum of the water being drawn upon, or of the supply running so low that the water would be affected by vegetable impurity. They have no doubt that the collecting area will furnish all the water required, both for consumption and compensation, and that the nature of the rock will enable them to construct a water-tight reservoir.

A French Municipal Gas-Works Leased.—We learn from the "Journal de l'Eclairage au Gaz" that the Municipality of Beaune have lately been considering offers from private parties to take over their gas-works and establish plant for the supply of electricity; and the result has been that the terms submitted by M. Christophe, of Bédarieux (Hérault), have been accepted. He will enter into possession on Jan. 1, 1900, conditionally on the payment, ten days before that date, of a sum of 200,000 frs. He will pay the Municipality 3625 frs. per annum, and supply gratuitously the gas required for lighting the public buildings and thoroughfares. He undertakes to put up an electricity supply station; and at the end of forty years the Municipality will renew his concession thereof for a similar period, provided application is made for it a year in advance. At the end of the lease, the gas-works will revert to the town, subject to the payment by the Municipality for the stock of material thereon at invoice price.

Colwyn Bay District Council and the Gas-Works.—As a result of the inquiry conducted by Colonel Smith into the merits of the Colwyn Bay District Council's application for consent to purchase the undertaking of the Colwyn Bay and District Gas Company, Limited, the Local Government Board state as follows in a letter recently received: "The Board are advised that, in the absence of special provision in the Company's Act in that behalf, the powers of the Public Health Act, 1875, are not at present available for the purpose of a loan for the purchase of the undertaking, and that powers which could apparently be obtained by means of a Provisional Order under the Gas and Water Works Facilities Act will be necessary to enable the District Council to borrow money for the purpose mentioned, and to carry on the undertaking in the event of its purchase by them. At the same time, the Board are not aware of any reason why their consent should not be given to the purchase of the undertaking; but their final decision must be deferred until the question of the issue of the requisite Provisional Order has been settled."

Extensions at the Wigan Gas-Works.—Last Friday, Mr. E. P. Burd held an inquiry respecting an application made to the Local Government Board by the Wigan Corporation for sanction to the borrowing of £17,000 for the extension of the gas-works. There was no opposition.

Decisive Vote Against the Purchase of the Gas-Works at Farnham.—The Farnham gas-works purchase question has come to an end; and the Company will remain in possession of their property. The proposal was submitted to the vote of the ratepayers, with the result that 859 declared themselves adverse to it, and only 298 were in favour.

The Gas Workers and General Labourers' Union.—According to the report of the General Secretary of this Union, the receipts for the quarter ending in September amounted to £5400, or £453 more than in the preceding three months, and £1548 more than in the corresponding quarter of 1898. The number of members at the end of September was 45,669, against 40,257 at the corresponding time last year—an advance of 5412. A sum of £2891 was distributed in strike and lock-out pay; and £477 was obtained as compensation for accidents to members.

Sales of Shares.—At a recent sale at Brighton, Messrs. Wilkinson, Son, and Welch sold by auction two £100 lots of "A" ordinary consolidated stock in the Brighton and Hove General Gas Company for £195 10s. and £195, and 25 fully-paid £10 "B" shares in the Eastbourne Gas Company for £24 each. At Chatham, last Tuesday, Messrs. Kidwell and Sons disposed of 500 £5 shares in the Rochester, Chatham, &c., Water Company; being part of the capital authorized by the Company's Act of 1898. The shares fetched £10 each, with the exception of three, which realized £10 2s. 6d. and five which were sold for £10 1s. apiece. On the same day, at Strood, Mr. C. D. Levy sold 15 "D" shares of £8 10s. each in the Rochester, &c., Gas Company, on which 10 per cent has always been paid. They fetched £23 each. Three "C" shares of £3 2s. 6d., bearing a maximum dividend of 7 per cent., were disposed of for £6 15s. per share.

Projected Extensions at the Mansfield Gas-Works.—At the meeting of the Mansfield Town Council on Friday, the minutes presented by the Gas Committee contained a recommendation that application should be made to the Local Government Board for a Provisional Order to sanction the raising of £20,000 of additional capital for carrying out the following extensions at the gas-works: Purifying-house and purifiers (part cost), £2000; extensions and enlargement of mains, £3600; new meters, £1000; extension of retort-house and new retort-stacks, £3850; additional condensers, £450; enlargement of tower scrubber, £600; new gasholder, 150 feet in diameter, 300,000 cubic feet capacity, £6500; purchase of additional land, (say) £2000—total, £20,000. Alderman J. H. Blake, in submitting the recommendation, said everyone must be aware that the gas undertaking could not possibly be carried on without increasing the capital. In the year 1880, the quantity of gas made was 42 million cubic feet; but this had now been increased to 80 millions. There had been a good deal said about the introduction of electric light, and he hoped this would soon be an accomplished fact; but he did not think this would materially affect the consumption of gas. The minutes were adopted.

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BLACKBURN	1,250,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.,	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000

And Additional Work, including complete Gas-Works at Nelson and Rossland, British Columbia.

Reductions in Price.—The Uxbridge Gas Company have decided to reduce the charge for gas supplied for public lighting by 5d. per 1000 cubic feet—from 3s. 11d. to 3s. 6d. The Hornsey Gas Company have reduced their price to 3s. per 1000 cubic feet.

Stoking Machinery for the Gaslight and Coke Company.—The Directors of the Gaslight and Coke Company have decided to employ stoking machinery for their works at Shoreditch and Bow, and have given an order to Sir William Arrol and Co., Limited, of Glasgow, for two complete installations of their hydraulic machines. The plants will consist of four charging and four drawing machines, with six elevators for the coal, besides the necessary pumping-engines, coal-breakers, &c. At the Company's works at Beckton, there are no fewer than 32 of the Arrol-Foulis machines in use, with 16 elevators and four hydraulic pumping-engines.

Derwent Valley Water Board.—The first meeting of the Derwent Valley Water Board was held at the Town Hall, Derby, last Thursday. The whole of the representatives of the various districts interested were present. The business before the meeting was the appointment of Chairman, Deputy-Chairman, Standing Arbitrator, Hon. Treasurer, Committees, and Clerks. These were elected as follows: Chairman: Alderman T. R. Gainsford (Sheffield); Deputy-Chairman, Alderman E. Wood (Leicester). Standing Arbitrator: Sir Samuel G. Johnson (Nottingham). Hon. Treasurer: Sir Henry Bemrose, M.P. (Derby). Clerk: Mr. J. Bell, Town Clerk (Leicester). General Purposes Committee: The Chairman and Deputy-Chairman of the Board, Alderman E. H. Fraser (Nottingham), Alderman R. Styring (Sheffield), and Alderman A. Woodiwiss (Derby). Finance Committee: The Chairman and Deputy-Chairman, Alderman J. Jelley (Nottingham), Alderman W. W. Vincent (Leicester), Alderman J. W. Newbold (Sheffield), and Sir Henry Bemrose (Derby). It was arranged to hold the next meeting at Leicester, on Dec. 1.

Suffocated by Gas in a Birmingham Hotel.—A fatality which occurred the previous Sunday night at the Market Hotel, Birmingham, was investigated by the City Coroner on Wednesday. The victim was Robert George White (23), who had been acting temporarily as private secretary at Little Aston Hall, Sutton Coldfield. He arrived at Birmingham on Sunday; and with his brother had been visiting some friends. He put up at night at the Market Hotel, where his brother and the latter's wife were staying. His absence at breakfast-time the following morning, and the failure to wake him by knocking, led to the door of his room being burst open. The room was full of coal gas, and the deceased lay on his bed unconscious, but still breathing. Emetics were administered as far as possible, and efforts were made to produce respiration artificially; but these, although long persisted in, proved fruitless. It was shown that the gas-bracket in the deceased's room was in perfect order; but a peculiar feature of the case was that the brother was unable to say whether the gas was on when he burst into the room. If it was (as there seems no doubt it was), he mechanically turned it off. As, however, there was nothing that pointed to suicide, the jury returned a verdict of "Accidental death."

Rhyl and its Water Supply.—A largely-attended meeting of the ratepayers of Rhyl was held last Tuesday evening for the purpose of considering the proposals of the Rhyl Urban Council to go to Parliament for powers to construct a new storage reservoir, and to acquire control of the watershed. A motion in favour of the proposal having been proposed, an amendment was moved that the ratepayers decline to give their sanction to the Bill. On a show of hands, the majority was overwhelmingly in favour of deferring the matter for the present. A special meeting of the Council was held next day, to consider the position of affairs; and, after a lengthy discussion, it was finally decided to defer the Bill for a twelvemonth, and refer the whole matter to the Water Committee.

Halifax Corporation Gas Committee and their Employees.—The gas workers in the employ of the Halifax Corporation have presented a requisition to the Committee, signed by 219 out of the total of 400 employees, asking for the abolition of the agreement which the employees have the option of entering into, and which binds them to continue in their employment until the end of the season. The requisition also asks that the Gas Workers' Union shall be recognized by the Committee; and further an advance of wages is desired. The Committee have considered the requisition, and as a preliminary to further discussion have decided to have a ballot taken of the employees, to see whether the men wish as a body that the officials of the Union should act for them on any matters they want to bring before the Committee. Another report goes rather farther, and states that "veiled threats having been received as to the possibility of a strike taking place at the works, the Committee ha appointed a Special Committee, so that, in such an event, they may take such steps as they deem necessary for the carrying on of the works."

Newton-in-Makerfield Gas-Works Extensions.—An inquiry was held last Thursday at Earlestown, by Mr. E. Pearce Burd, on behalf of the Local Government Board, relative to an application by the Newton District Council for a Provisional Order to obtain powers to borrow £20,000 for gas-works extensions. Mr. D. H. Lloyd, Gas and Water Engineer, stated that during the last four years the consumption of gas had very largely increased. The carbonizing plant was capable of producing 800,000 cubic feet per day, and the works were supplying 500,000 cubic feet. New mains, to the extent of 3¼ miles, were now being laid, and when completed the carbonizing plant would be producing at its utmost capacity, without any margin for safety. The Town Clerk, in reply to the Inspector, stated that the amount of outstanding loans was £11,645. The district was growing very considerably, and the number of gas consumers was increasing by leaps and bounds. The profit for last year was £737; this being about 2½ per cent. on the outlay of capital. Application to borrow could only be made under a Local Improvement Act, which set forth that a sum of money must be set aside for the repayment of loans, but which prevented the adoption of the annuity principle. The Inspector said he could see no reason why the Local Act limited the borrowing powers to gas funds. He considered the proper plan would be to quash the Act, and make new provisions under the Public Health Act.

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Absolutely the most effective White Light Stove made.

No. 590 - - - - 63s.

No. 590 B.B. (With Boiling Burner on Top) - 68s.

Cleckheaton and the Bradford Water Supply.—In consequence of the receipt of an unsatisfactory reply to the complaints made to the Bradford Corporation as to the character of the water supply in Cleckheaton since the drought, the General Purposes Committee of the District Council have instructed their Solicitor (Mr. W. H. Clough) to advise them with reference to their exact relations with the Corporation in the matter of the supply.

Tees Valley Water Supply.—The report of the Tees Valley Water Board for the six months ending August last shows an increase of £3643 as compared with the preceding similar period, and one of £5098 in comparison with the half year before that. Since last November, the water supplied for domestic purposes has risen from 18 to rather more than 20 million gallons per week, and to large consumers from 60 to 64¼ million gallons per week, averaged for the corresponding three months this year. This reduces the margin of 22 million gallons by 6¼ millions; justifying, in the opinion of the Board, the attention given to the new reservoirs.

The Price of Gas at Ebbw Vale.—At last Thursday's meeting of the Ebbw Vale District Council, a letter was read from the Ebbw Vale Gas Company giving notice that from January next the price of gas would be increased 1s. per 1000 cubic feet for all purposes, on account of the increased cost of materials. This will mean an advance for public lighting to 4s. 6d. (the Council finding all requisites), and to 5s. per 1000 cubic feet for private consumers. Several members remarked upon the strong feeling in the town against the proposal; and a letter was read from the local Trades and Labour Council requesting the District Council to call a public meeting on the matter. The Chairman (Mr. A. Jones) stated that several tradesmen were prepared to go in for an electric installation; and it was also suggested that the Council might undertake the supply of gas on their own account, as the Company held no statutory powers as a Gas Company. A deputation was appointed to meet the Company before taking further steps.

New Gas and Water Powers for the Bradford Corporation.—A special meeting of the Bradford Corporation was held last Friday for the purpose of finally sanctioning an application to Parliament for powers to deal with various matters to be included in the forthcoming Corporation Bill. It was decided that the application should embrace the following, among several other, objects: (1) The purchase of the undertakings of the Clayton, Allerton, and Thornton Gas Company, the North Bierley Gas Company, the Airedale Gas Company, and the Eccleshill and Bolton Gas Company; the purchase of gas in bulk, under certain conditions and arrangements, from the Drighlington and Gildersome Gas Company; the extension of the limits of gas supply of the Corporation; and the alteration of the limits of supply of the Drighlington and Gildersome Gas Company. (2) The purchase of lands and properties for protecting from pollution waters and water-works in the drainage area in and along the River Nidd, River Worth, and becks adjacent or in the neighbourhood thereof, or affecting the waters and water-works of the Corporation. The interesting discussion regarding the gas supply of the out-districts will therefore be resumed.

The Falmouth Water-Works Purchase Scheme.—Another meeting of the Falmouth Town Council was held last Thursday, on a requisition by some of the members who were anxious that the water-works purchase scheme should be proceeded with. There was some discussion as to who was responsible for the failure of the scheme; but the meeting separated without coming to any decision. The Mayor said that to proceed in the absence of further information, and without consulting Penryn, would be to court defeat. This attempt to galvanize it into life having failed, the scheme is dead. It will, however, probably be immediately revived in another form.

Cambridge Corporation and the Water-Works.—The Cambridge Town Council last Wednesday discussed the expediency of promoting a Bill in Parliament for several objects, among them being the purchase of the local water-works, and the obtaining of the powers necessary to the carrying on of the undertaking. The various proposals were considered separately; and on the resolution referring to the water-works being introduced, it was discussed at some length. Several members were of opinion that the purchase-money and the expenses incidental to procuring parliamentary powers, and the subsequent proceedings connected with the transfer, would involve such a considerable expenditure, that the undertaking would become a burden on the rates. The resolution received the support of 24 members, eight were against it, and five were neutral; but, as there was not an absolute majority in favour, it was declared lost.

The Directors of the East London Water Company are inviting tenders for the issue of £150,000 of 3 per cent. debenture stock, redeemable at par after the expiration of 25 years from the date of issue, subject to six months' notice.

The Conservators of the Thames have decided that the bye-laws made by them with regard to the carriage of petroleum on the river shall apply to carbide of calcium. Carbide shall only be carried in metal drums which shall be strongly made, and securely closed, so as to be air-tight and water-tight. The quantity of carbide contained in any drum shall not exceed 140 lbs. avoirdupois. Above, or to the westward of Thames Haven, carbide is only to be carried on the Thames in open barges licensed for the purpose by the Conservators.

Last Thursday evening, at the Grand Hotel, Birmingham, Mr. Herbert Humphries, who had received instructions from Mr. A. E. Mason, Chartered Accountant, of Dudley, on behalf of the Trustee for debenture-holders, offered for sale the freehold property of the Midland Acetylene (Parent) Syndicate, known as the Acetylene Works, Corngreaves, Cradley Heath, together with the goodwill and up-to-date electrical plant used in the manufacture of carbide of calcium. He explained that the reason the property came into the market was that thousands of pounds had been wasted at the works, and the debenture-holders refused to put any more money into the concern. No bid was forthcoming; and Mr. Humphries stated that, if a sale were not effected by private treaty, the property would be broken up, and disposed of in lots at any sacrifice.

C. & W. WALKER, Ltd.

Midland Iron-Works, DONNINGTON,
Near NEWPORT,
SHROPSHIRE.

110, CANNON ST.,
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Telegraphic Addresses:
"FORTRESS, DONNINGTON, SALOP."
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PURIFIERS.
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Weck's Patent Centre-Valve for Four Purifiers.

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OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
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"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

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BROTHERTON & CO.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.

Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see Nov. 7, p. 1154.]

SULPHURIC ACID for Sale.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SHEFFIELD CHEMICAL COMPANY, LIMITED.

BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

GAS CARBON Wanted, not less than 4-Ton Loads.

Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
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Telegrams: "ENAMEL." National Telephone 1769.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.

Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

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Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.

Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

ENRICH your Gas with cheap Benzol.

Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER AND CO., MIDDLESBROUGH.

PRACTICAL RETORT SETTERS.

BATES & NUTTALL, 32, Havelock Road, Saltley, Birmingham.

Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

GAS TAR wanted.

BROTHERTON AND CO, Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

MELROSE CYCLES

SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. MELROSE CYCLE COMPANY, COVENTRY.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

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J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

SPENT OXIDE wanted.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BENZOL, specially made for the Enrichment of Gas.

ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

A NEW Style of Hydraulic Main. No more thick Tar in the Main. Specification and a Photograph of the Machine, and how to make and fit it up, can be obtained from the Inventor for 10s. 6d.

S. CARPENTER, Ryde House, 28, Woodhouse Grove, EAST HAM.

WANTED, an Engagement by the Advertiser, a GAS MANAGER, with extensive Home and Colonial experience, who will be disengaged in the early part of the month of October. Well up in all the details of modern Gas-Works Construction and its Management, and the most approved Appliances introduced to economize the production of Gas and extend its use. Practically acquainted with both American and German Carburetted Water-Gas Plant and its manipulation. A good Draughtsman and Accountant. Satisfactory References and Testimonials.

Address No. 3332, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, Two good Retort-HOUSE FOREMEN.

Apply to the MANAGER, Gas-Works, COVENTRY.

WANTED, a Young Man to lay Mains and Services, fix and read Meters, and to make himself generally useful on a Gas-Works.

Apply, stating Age, Experience, and Wages required, to the MANAGER, Gas-Works, NEWMARKET.

WANTED, a competent Draughtsman by a Firm of Contracting Gas Engineers. He must be accustomed to Designing and Detailing Elevating and Conveying Plant in all its Branches. Permanent Situation to a good Man.

Apply, by letter, stating Age, Experience, and Salary required, to No. 3380, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, by the Irthlingborough Gas and Coke Company, a steady and reliable WORKING FOREMAN (make about 13 millions).

Apply, by letter, with References, stating Age, Experience, and Wages required, to

JOHN E. MILLS,
Manager and Secretary.

WANTED, a Fitter, used to Main and Service Laying, fixing Meters, and the fitting of Houses. Wages 26s. per week.

Applications, with full Particulars as to Age, Experience, &c., with *copies* of Testimonials, to

A. FORRETT,
Manager.

Gas-Works, Blackwell,
Near Alfreton.

MARKET HARBOROUGH URBAN DISTRICT COUNCIL.

WANTED, a competent Gas Manager, to take charge of the Market Harborough Gas-Works, Mains, Services, and Meters. He must have a practical knowledge of the Manufacture of Gas, Sulphate of Ammonia, and all Residuals.

Salary £175 per annum, to be increased as the Sale of Gas grows. House, Rates, Coal, and Gas free.

Applications, with *copies only* of not less than three Testimonials of recent date, to be sent to me (marked "Gas Manager") on or before Nov. 25, 1899.

By order of the Council,
G. O. NICHOLSON,
Clerk.

Market Harborough
Nov. 8, 1899.

SHEFFIELD UNITED GASLIGHT COMPANY.

WORKS SUPERINTENDENT.

WANTED, by the Directors of this Company, an experienced and competent Man to act as SUPERINTENDENT at their Neepsend Gas-Works. Preference will be given to one who has been used to Regenerative Furnaces and Mechanical Stokers. He will be provided with a House near the Works, Rent and Rates free.

The maximum make of Gas at this Station is about 7½ million cubic feet per day.

Applications, marked "Superintendent," stating Age, previous Engagements, and Salary required, to be made by letter only, addressed to Sir Fredk. T. Mappin, Bart., M.P., Chairman of the Company, Gas Offices, Sheffield, not later than Monday, the 27th inst.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street,
Sheffield, Nov. 8, 1899.

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BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.

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SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

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JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.

Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, or NEWTON GRANGE, NEWBATTLE, DALKEITH, SCOTLAND.

CITY OF MANCHESTER.

THE Gas Committee of the Manchester Corporation are prepared to receive applications for the position of ENGINEER. Candidates must possess a thorough knowledge of Mechanics and Gas Engineering, the preparation of Plans, the construction of Gas-Works and Apparatus, the Manufacture, Purification, and Distribution of Gas upon the most approved modern systems, and the various Chemical Operations in connection therewith.

The Salary to commence at £800 per annum.

The person appointed will be required to join the Corporation Thrift Fund, to devote the whole of his time to the discharge of his Duties, and to execute the usual Three Months' Agreement.

Sealed applications, endorsed "Application for Appointment of Gas Engineer," stating the Name, Age, and Experience of the Candidate, and enclosing recent Testimonials, must be addressed to the Chairman of the Gas Committee and delivered at the Gas Office, Town Hall, Manchester, on or before Thursday, the 7th day of December, 1899.

Any Candidate canvassing for the appointment will be disqualified.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
Nov. 13, 1899.

WANTED, at once, a steady reliable Man as UNDER STOKER. Shovel Charging; Night and Day Shifts. To a reliable Man constant employment. Wages 25s. per week.

Apply, by letter, giving Age and References from last employment, to G. E. HICKFORD, Manager, Gas-Works, Kingston Road, Leatherhead, SURREY.

LOUGHBOROUGH GAS COMPANY.

WANTED, at once, a thoroughly efficient CLERK. Must have experience of Collecting Gas Rental, Meters, and Gas Company's Accounts. Salary, including Collector's Commission, about £130 per annum.

Applications, in own handwriting, stating Age and Experience, and enclosing not more than two recent Testimonials, to be addressed to

W. F. BEARDSLEY,
Solicitor.

Loughborough.

COUNTY BOROUGH OF WEST BROMWICH.

ASSISTANT GAS MANAGER.

THE Gas Committee of the Corporation invite applications for the position of ASSISTANT GAS MANAGER.

App'icants should have had a thorough and complete training in the Manufacture and Distribution of Gas, and should also be competent to prepare Plans and Specifications of new Works or Alterations of existing Works.

Salary £130 per annum.

Applications, accompanied by three Testimonials of recent date, to be sent to me, endorsed "Assistant Gas Managership," not later than Saturday, the 25th of November.

By order of the Committee,
THOS. HUDSON,
Secretary.

Town Hall, West Bromwich,
Nov. 8, 1899.

HAVERHILL URBAN DISTRICT COUNCIL.

APPOINTMENT OF GAS-WORKS MANAGER.

THE Haverhill Urban District Council invite Applications from thoroughly practical persons for the appointment of GAS-WORKS MANAGER.

Annual Manufacture, about 13 millions.

The duties comprise care and management of Works, Mains, Public Lighting, &c., taking Meters, and also care and management of Shone's Ejectors at Sewage Farm, Boilers, Engine, and Compressors for working same situated at Gas-Works. Applicants must be capable Gas-Fitters, and competent to execute minor Repairs to Engine, Ejector, &c.

Salary £100 per annum, payable monthly, with House, Coal, and Gas. The person appointed will be required to devote the whole of his time to the duties of the appointment.

Duties to begin on or about the 18th of December.

Applications, accompanied by *copies* of not more than three Testimonials of recent date, must reach me not later than the 2nd of December, endorsed "Gas Manager."

By order,
SIDNEY H. GRAHAM,
Clerk to the Council.

Haverhill, Suffolk,
Nov. 17, 1899.

WANTED, a Gas-Fitter (Improver), used to fixing Gas Cookers, Fires, Meters, &c., for a small Town in Essex.
Apply, by letter, to No. 3896, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

IRON ROOF for Sale, 132 feet long by 53 ft. 4 in. Span, in first-class condition.
Apply to CLAYTON, SON, AND CO., LIMITED, Hunslet, LEEDS.

ENGINE and Exhausters, 20,000 and 30,000 cubic feet per hour, delivered immediately. Cheap to clear.
J. F. BLAKELEY, Thornhill, DEWSBURY.

CAST Tank, 31 feet diameter, 12 feet deep, £4 15s. per ton. Straps and Bolts included. Five Years old.
J. F. BLAKELEY, Thornhill, DEWSBURY.

FOR SALE—A 3-Horse Power Crossley (Latest Patent) "OTTO" GAS-ENGINE. Quite new; has only done six months' light work.
Address No. 3885, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A Crossley Two-Horse Power "OTTO" GAS-ENGINE, with Fittings complete. Guaranteed in excellent order; had very little wear. Price £50.
Apply to the GAS OFFICES, 15, Hart Street, HENLEY-ON-THAMES.

MANSFIELD CORPORATION.
(GAS DEPARTMENT.)

FOR SALE—Four 15 feet Square PURIFIERS, with 12-inch Connections, Centre-Valve, and Lifting Gear, all complete, and in good working order. Being replaced with larger ones.
For further Particulars, apply to
ARTHUR GRAHAM,
Engineer and Manager.

FOR SALE.

THE Wokingham Corporation Gas- Works, having just completed the enlargement of their PLANT, have FOR DISPOSAL the following, all in good condition: Three 6 feet square PURIFIERS, STATION METER, CONDENSERS, and SCRUBBER.
Full Particulars upon application to
H. G. BATES,
Manager, &c.

CITY OF LINCOLN.
(GAS DEPARTMENT.)

THE Gas Committee of the Corporation of Lincoln invite TENDERS for the supply and erection of a complete PLANT for the Manufacture of CARBURETTED WATER GAS, including Purifiers, Station Meter, Relief Holder in Brick Tank, Oil Storage Tank, &c., but not including Foundations nor Buildings.
Full Particulars may be obtained on application to the undersigned.
Tenders, suitably endorsed, and addressed to the Chairman of the Gas Committee, Gas Offices, Lincoln, to be delivered on or before the 15th of December next.
JNO. CARTER,
Manager.
Gas Offices, Lincoln,
Nov. 15, 1899.

CITY OF MANCHESTER.
(GAS DEPARTMENT.)

TENDERS FOR METERS.

THE Gas Committee are prepared to receive TENDERS for the supply and repair of ORDINARY and PREPAYMENT GAS-METERS during the ensuing One, Two, or Three Years, commencing on the 1st of January, 1900.
The Committee do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gas-Meters," must be delivered at the Offices of the Gas Department, Town Hall, on or before Wednesday, the 6th day of December, 1899.
Forms of Tender and further Particulars may be obtained on application to Mr. C. Nickson, Superintendent of the Department.
By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.
Town Hall, Manchester,
Nov. 3, 1899.

KETTERING GAS COMPANY.

TO BUILDERS AND CONTRACTORS.

THE Directors of the above Company are prepared to receive TENDERS for the construction of a Brick and Puddle GASHOLDER TANK, 138 feet diameter.
Plans and Specifications may be seen at the Offices of the Gas Company, Kettering, on and after Saturday, the 18th inst.
Copies of the Specification may be had on payment of One Guinea, which will be returned on the receipt of a Tender, as therein required.
Tenders to be delivered at the Office of the Kettering Gas Company, addressed to the Chairman, and marked "Tender for Tank," on or before Tuesday, the 28th inst.
Persons tendering are desired to state if they have undertaken work of a similar description, and to furnish References of the same.
The Directors do not pledge themselves to accept the lowest or any Tender.
THOS. E. MADDOCKS,
Secretary.
Kettering, Nov. 15, 1899.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

RETORT-HOUSE ROOF.

THE Directors of the Ilford Gas Com- pany are prepared to receive TENDERS for a RETORT-HOUSE ROOF, &c.
Drawings and Specification may be seen at the Engineer's Office, Gas-Works, Ilford, on and after the 15th inst., or Copies, with Specification, will be supplied for Half-a-Guinea (not returnable).
Tenders, endorsed "Retort-House Roof," addressed John Denney, Esq., Secretary, Ilford Gas Company, to be sent in on or before Monday, Dec. 4, 1899.
J. H. BROWN,
Engineer and Manager.

INCLINED RETORTS.

THE Directors of the Ilford Gas Com- pany are prepared to receive TENDERS for an INSTALLATION of INCLINED RETORTS.
Drawings and Specification may be seen at the Engineer's Office, Gas-Works, Ilford, on and after the 15th inst., or Copies will be supplied for One Guinea (not returnable).
Tenders, endorsed "Tender for Inclined Retorts," addressed John Denney, Esq., Secretary, Ilford Gas Company, to be sent in on or before Monday, Dec. 4, 1899.
J. H. BROWN,
Engineer and Manager.

CITY OF SHEFFIELD.
(WATER DEPARTMENT.)

LEAD PIPING AND GUN-METAL FITTINGS.

THE Water Committee of the Corpora- tion of Sheffield invite TENDERS for the supply of: (1) LEAD PIPE, SHEET and PIG LEAD, and of (2) BIB, STOP, and BALL COCKS, FERRULES, and other GUN-METAL and BRASS CASTINGS, in such quantities as may be required during the Twelve Months ending the 31st of December, 1900.
Specifications and Forms of Tender may be obtained on application to the GENERAL MANAGER, WATER DEPARTMENT, TOWN HALL, SHEFFIELD, on payment of One Guinea, which will be returned on receipt of a *bonâ-fide* Tender.
Tenders, endorsed "Tender for Lead Piping" and "Tender for Gun-Metal Fittings" respectively, must be sent in not later than Saturday, the 2nd prox., addressed to the undersigned.
The Committee do not bind themselves to accept the lowest or any Tender; and persons tendering must do so at their own cost.
The Contract will comprise the Fair Wages and Conditions of Labour Clause which has been adopted by the Sheffield Corporation.
WM. TERREY,
General Manager.
Water-Works Office, Town Hall,
Sheffield, Nov. 11, 1899.

HARTLEPOOL GAS AND WATER COMPANY.

IMPORTANT SALE OF SHARES.

TO be Sold by Auction, at the Company's Offices, Middleton Road, West Hartlepool, on Thursday, the 23rd day of November, 1899, at 3.15 p.m. precisely,

J. W. CROSBY, AUCTIONEER,

500 SHARES OF £10 EACH,

(Maximum Dividend limited to 7 per cent. per annum), being part of the Gas Capital authorized to be issued by the Hartlepool Gas and Water Act, 1878, and required by Section 9 of that Act to be offered to the public for Sale by Auction.
The above Shares will be entitled to Dividend from the 22nd day of December next, and to be registered in the name of the Purchaser without charge.
A Deposit of 10 per cent. will be required to be paid at the time of Sale; the remainder to be paid on or before the said 22nd day of December.
The Shares will be sold in Lots of Ten each.
By order of the Directors,
THOMAS TREWHITT,
Secretary.
Hartlepool Gas and Water Company's Office,
West Hartlepool, Oct. 12, 1899.

TOWN OF DUDLEY GASLIGHT COMPANY.

ISSUE OF £10,000 NEW ORDINARY STOCK.

THE Directors of the Town of Dudley Gaslight Company invite TENDERS for

£10,000 NEW ORDINARY STOCK,

to be issued in pursuance of the Powers of the "Dudley Gas Act, 1881." Maximum Dividend, 7 per cent. per annum.
The Stock may be held in multiples of £10, with a minimum holding of £50, and will be registered in the Company's Books, and Certificates issued, *free of any expense.*
Tenders must be delivered at the Company's Office, Gas-Works, Dudley, not later than Twelve o'clock (noon), on Tuesday, the 12th day of December next, accompanied by a Deposit of £10 per cent. of the nominal amount of Stock Tendered for.
Every Purchaser shall pay the remainder of his Purchase-Money on or before the 1st of January, 1900, to the Company's Bankers, the Birmingham District and Counties Banking Company, Limited, Dudley, to the credit of the Company.
Particulars and Forms of Tender may be obtained at the Company's Offices.
By order,
T. E. STILLARD,
Secretary.
Gas-Works, Dudley,
Nov. 1, 1899.

TO GAS-METER MANUFACTURERS.

THE Gas Committee of the Corporation of Burnley are prepared to receive TENDERS for the supply and erection of a STATION METER, to register 100,000 cubic feet of Gas per hour.
Specifications and Forms of Tender may be obtained on application to the undersigned.
Tenders, endorsed "Station Meter," and addressed to the Chairman of the Gas Committee, Town Clerk's Office, Burnley, to be sent in on or before Wednesday, the 29th day of November, 1899.
JNO. P. LEATHER,
Gas Engineer.
Gas-Works, Burnley,
Nov. 17, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
HARROW AND STANMORE GAS COMPANY.

NEW ISSUE OF 259 £10 "C" SHARES.
STANDARD DIVIDEND 7 PER CENT.; LAST DIVIDEND £5 12s. PER CENT.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, Nov. 29, at Two o'clock.
Particulars of the AUCTIONEER, as above.

By order of the Directors of the
BARNET DISTRICT GAS AND WATER COMPANY.

NEW ISSUE OF £5000 "D" GAS STOCK,
Ranking for a Maximum Dividend of 7 per cent., the last Dividend on similar Stock in the Company having been £6 6s. per Cent. per annum.
TO BE SOLD BY AUCTION BY
MR. ALFRED RICHARDS, at the Mart, E.C., on Wednesday, Nov. 29, at Two o'clock.
Particulars of the AUCTIONEER, as above.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 600 £10 ADDITIONAL ORDINARY SHARES.
MAXIMUM DIVIDEND 7 PER CENT.; LAST DIVIDEND 5½ PER CENT.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, Nov. 29, at Two o'clock.
Particulars of the AUCTIONEER, as above.

By order of Trustees.
£170 FOUR PER CENT. PERPETUAL DEBENTURE STOCK
OF THE
READING GAS COMPANY.

TO be Sold by Auction by Mr. Alfred RICHARDS on the above date.
Particulars of the AUCTIONEER, as above.

By order of the Directors of the
COMMERCIAL GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday Dec. 5, at Two o'clock precisely, in Lots,

£3037 OF NEW STOCK,

Ranking for a Standard Dividend of 7 per Cent., subject to the Sliding-Scale; the last Dividend on the Company's New Stock having been at the rate of 10½ per cent. per annum. Also

£8167 OF FOUR-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK OF THE COMMERCIAL GAS COMPANY.

Particulars of the SECRETARY OF THE COMPANY, at their Offices, Ben Jonson Road, STEPNEY, E.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of Trustees.
SOUTH ESSEX WATER-WORKS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 5, at Two o'clock, in Lots.

£900 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

£625 FIVE PER CENT. PREFERENCE STOCK, & £1085 ORDINARY STOCK
OF THE
SOUTH ESSEX WATER-WORKS COMPANY.

Particulars of the AUCTIONEER, as above.

By order of the Directors of the
SOUTHEND GAS COMPANY.

ISSUE OF £7000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 12, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

REDUCTION IN THE PRICE OF GAS.

THE Hornsey Gas Company Hereby give Notice that the PRICE OF GAS has been REDUCED as from Michaelmas Quarter, 1899, to 3s. 0d. per 1000 cubic feet.

By order of the Board,
S. J. WILLIAMS,
Secretary.

Chief Office: 63, Chancery Lane, W.C.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

CIRCULAR GIRDER ROOF.

THE Commissioners are prepared to receive TENDERS for the construction of a CIRCULAR GIRDER ROOF, covering a Building 386 feet long by 100 feet span.

Specification, with Schedule of Quantities and Form of Tender, may be obtained upon application to the Chief Engineer and Manager, Mr. W. R. Herring, Gas-Works, Edinburgh, where Detailed Drawings may be inspected.

The Tender Forms supplied must be filled in and signed by a Principal or a Declared Agent of the parties tendering, and returned undetached from the Specification, and addressed to the undersigned, at or before Ten a.m., on the 9th day of December next, 1899, sealed and endorsed "Tender for Circular Girder Roof."

The Commissioners do not bind themselves to accept the lowest or any Offer.

JAMES Mc G. JACK,
Clerk.

25, Waterloo Place,
Edinburgh, Nov. 17, 1899.

Now Ready, Price 15s., Limp Cloth,

— NINETEENTH YEAR —

AN

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OF THE

METROPOLITAN WATER COMPANIES

AND OF THE

EDINBURGH, GLASGOW, & MANCHESTER

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FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

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Yield of Gas 11,000 cubic feet per Ton of Coal, as per Analysis by
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FOR PRICES AND PARTICULARS, APPLY

S. J. DITCHFIELD,

SEAHAM HARBOUR,

COUNTY OF DURHAM.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to

W. H. PARKINSON,

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Telegraphic Address: "PARKINSON, NEWCASTLE."

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NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

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GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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Present Daily Produce available 3000 Tons.

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Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

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BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

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Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the

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FOR
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For use in the
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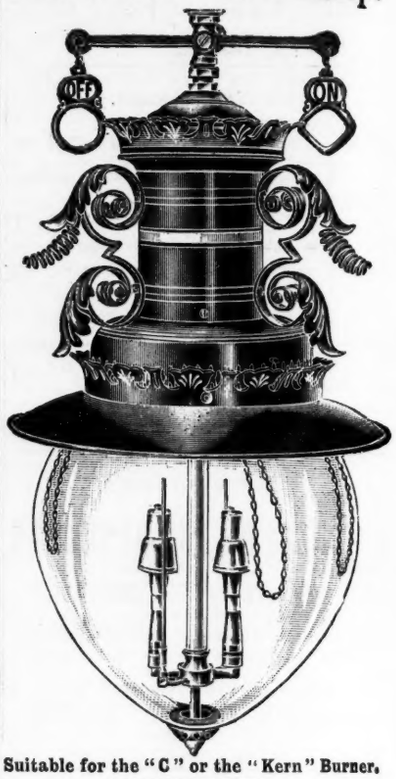

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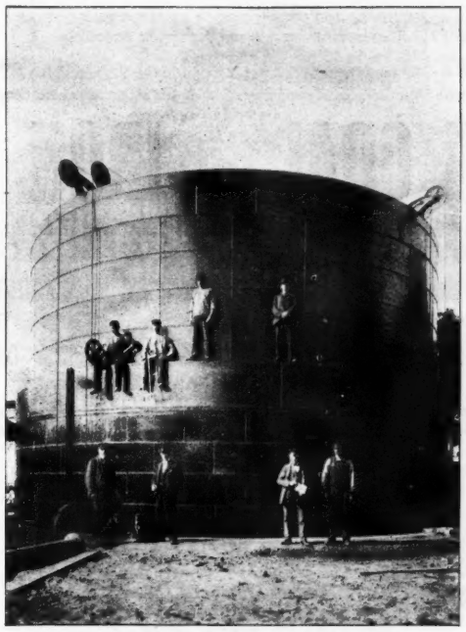

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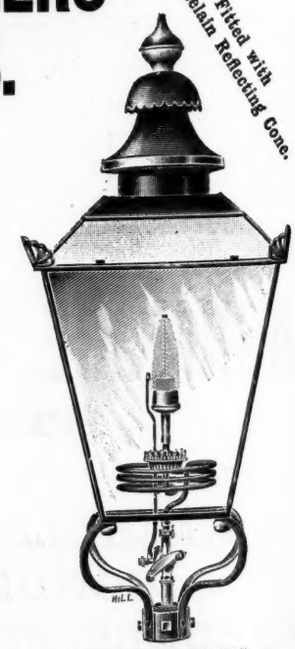

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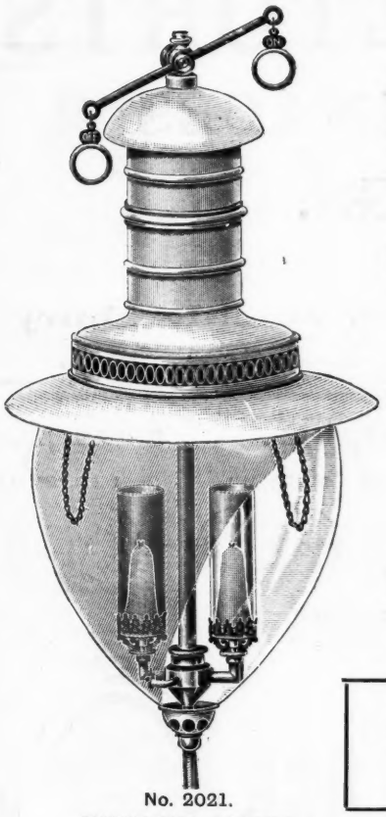

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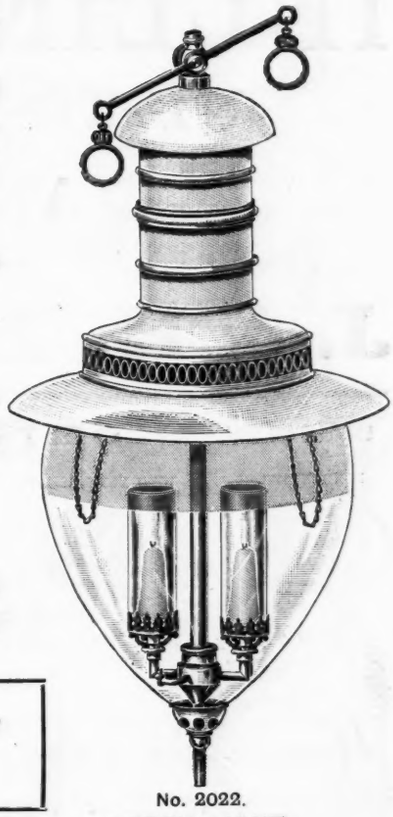
A similar Lamp made for Electric Light.



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Prices:—

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Guaranteed to give Record Results alike in Productive Capacity, Durability, Economy of Fuel, General Simplicity of Management.

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NOTE: The Agency held for some time by **JONAS DRAKE & SON, HALIFAX**, having ceased, they are debarred from Representing the Patentee, or introducing any of his arrangements, under any pretext whatever.

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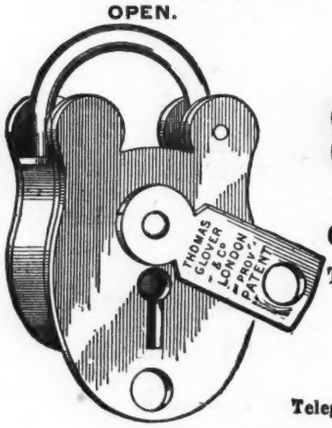

THOMAS GLOVER & CO.'S
PATENT
SECURE PADLOCK
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Manufactured under the De Mare MASTER Patent and subsequent Minor Patents.

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COTTAGE SIZE.

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FOR SHOP AND INTERIOR LIGHTING.

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Maximum Light (without artificial pressure) 125 Candle Power.

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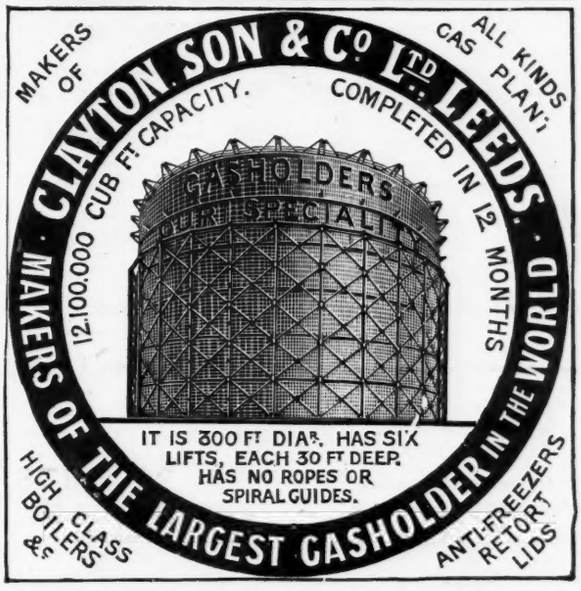
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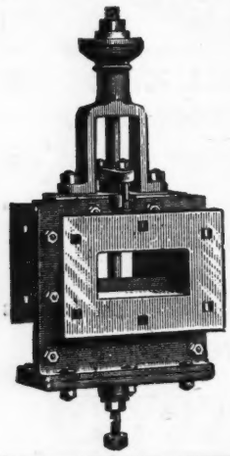

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